



KONICA MINOLTA

## SERVICE MANUAL

Theory of Operation

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# **bizhub**

## **501/421/361**

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        \* For particulars, see the contents of PC-407.

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\* For particulars, see the contents of SD-507.

**MT-502**

OUTLINE ..... 1

COMPOSITION/OPERATION ..... 3

\* For particulars, see the contents of MT-502.

**JS-502**

OUTLINE ..... 1

COMPOSITION/OPERATION ..... 3

\* For particulars, see the contents of JS-502.

# SAFETY AND IMPORTANT WARNING ITEMS

Read carefully the Safety and Important Warning Items described below to understand them before doing service work.

## IMPORTANT NOTICE

Because of possible hazards to an inexperienced person servicing this product as well as the risk of damage to the product, Konica Minolta Business Technologies, INC. (hereafter called the KMBT) strongly recommends that all servicing be performed only by KMBT-trained service technicians.

Changes may have been made to this product to improve its performance after this Service Manual was printed. Accordingly, KMBT does not warrant, either explicitly or implicitly, that the information contained in this Service Manual is complete and accurate.

The user of this Service Manual must assume all risks of personal injury and/or damage to the product while servicing the product for which this Service Manual is intended.




Therefore, this Service Manual must be carefully read before doing service work both in the course of technical training and even after that, for performing maintenance and control of the product properly.

Keep this Service Manual also for future service.













## DESCRIPTION ITEMS FOR DANGER, WARNING AND CAUTION

In this Service Manual, each of three expressions "**⚠ DANGER**", "**⚠ WARNING**", and "**⚠ CAUTION**" is defined as follows together with a symbol mark to be used in a limited meaning.

When servicing the product, the relevant works (disassembling, reassembling, adjustment, repair, maintenance, etc.) need to be conducted with utmost care.

-  **DANGER:** Action having a high possibility of suffering death or serious injury
-  **WARNING:** Action having a possibility of suffering death or serious injury
-  **CAUTION:** Action having a possibility of suffering a slight wound, medium trouble and property damage

Symbols used for safety and important warning items are defined as follows:

	<b>:Precaution when using the copier.</b>		<b>General precaution</b>		<b>Electric hazard</b>		<b>High temperature</b>
	<b>:Prohibition when using the copier.</b>		<b>General prohibition</b>		<b>Do not touch with wet hand</b>		<b>Do not disassemble</b>
	<b>:Direction when using the copier.</b>		<b>General instruction</b>		<b>Unplug</b>		<b>Ground/Earth</b>



## SAFETY WARNINGS

### [1] MODIFICATIONS NOT AUTHORIZED BY KONICA MINOLTA BUSINESS TECHNOLOGIES, INC.

Konica Minolta brand products are renowned for their high reliability. This reliability is achieved through high-quality design and a solid service network. Product design is a highly complicated and delicate process where numerous mechanical, physical, and electrical aspects have to be taken into consideration, with the aim of arriving at proper tolerances and safety factors. For this reason, unauthorized modifications involve a high risk of degradation in performance and safety. Such modifications are therefore strictly prohibited. The points listed below are not exhaustive, but they illustrate the reasoning behind this policy.

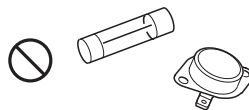
#### Prohibited Actions

##### DANGER

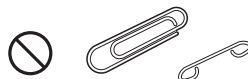
- Using any cables or power cord not specified by KMBT.



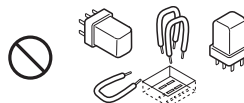
- Using any fuse or thermostat not specified by KMBT.  
Safety will not be assured, leading to a risk of fire and injury.



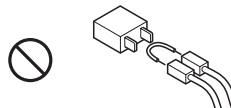
- Disabling fuse functions or bridging fuse terminals with wire, metal clips, solder or similar object.



- Disabling relay functions (such as wedging paper between relay contacts)



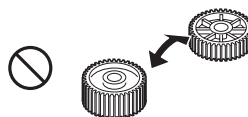
- Disabling safety functions (interlocks, safety circuits, etc.)  
Safety will not be assured, leading to a risk of fire and injury.



- Making any modification to the product unless instructed by KMBT



- Using parts not specified by KMBT



## [2] POWER PLUG SELECTION

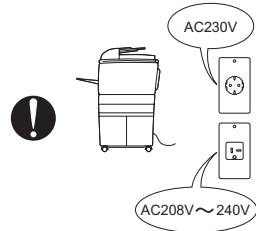
In some countries or areas, the power plug provided with the product may not fit wall outlet used in the area. In that case, it is obligation of customer engineer (hereafter called the CE) to attach appropriate power plug or power cord set in order to connect the product to the supply.

### Power Cord Set or Power Plug

#### WARNING

- Use power supply cord set which meets the following criteria:
  - provided with a plug having configuration intended for the connection to wall outlet appropriate for the product's rated voltage and current, and
  - the plug has pin/terminal(s) for grounding, and
  - provided with three-conductor cable having enough current capacity, and
  - the cord set meets regulatory requirements for the area.

Use of inadequate cord set leads to fire or electric shock.



- Attach power plug which meets the following criteria:
  - having configuration intended for the connection to wall outlet appropriate for the product's rated voltage and current, and
  - the plug has pin/terminal(s) for grounding, and
  - meets regulatory requirements for the area.

Use of inadequate cord set leads to the product connecting to inadequate power supply (voltage, current capacity, grounding), and may result in fire or electric shock.



- Conductors in the power cable must be connected to terminals of the plug according to the following order:
  - Black or Brown: L (line)
  - White or Light Blue: N (neutral)
  - Green/Yellow: PE (earth)



Wrong connection may cancel safeguards within the product, and results in fire or electric shock.

### [3] CHECKPOINTS WHEN PERFORMING ON-SITE SERVICE

Konica Minolta brand products are extensively tested before shipping, to ensure that all applicable safety standards are met, in order to protect the customer and CE from the risk of injury. However, in daily use, any electrical equipment may be subject to parts wear and eventual failure. In order to maintain safety and reliability, the CE must perform regular safety checks.

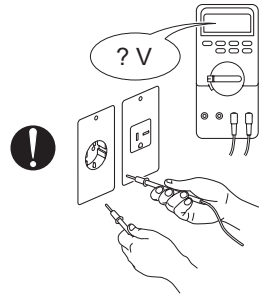
#### 1. Power Supply

#### Connection to Power Supply

##### **WARNING**

- Check that mains voltage is as specified.

Connection to wrong voltage supply may result in fire or electric shock.



- Connect power plug directly into wall outlet having same configuration as the plug.

Use of an adapter leads to the product connecting to inadequate power supply (voltage, current capacity, grounding), and may result in fire or electric shock.

If proper wall outlet is not available, advise the customer to contact qualified electrician for the installation.



- Plug the power cord into the dedicated wall outlet with a capacity greater than the maximum power consumption.

If excessive current flows in the wall outlet, fire may result.



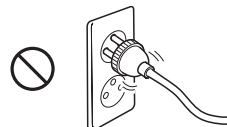
- If two or more power cords can be plugged into the wall outlet, the total load must not exceed the rating of the wall outlet.

If excessive current flows in the wall outlet, fire may result.



- Make sure the power cord is plugged in the wall outlet securely.

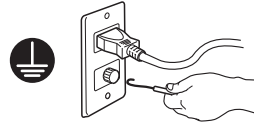
Contact problems may lead to increased resistance, overheating, and the risk of fire.



## Connection to Power Supply

### WARNING

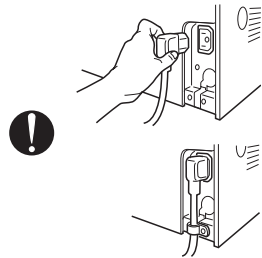
- Check whether the product is grounded properly.  
If current leakage occurs in an ungrounded product, you may suffer electric shock while operating the product.  
Connect power plug to grounded wall outlet.



## Power Plug and Cord

### WARNING

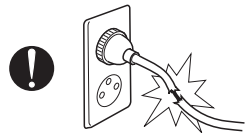
- When using the power cord set (inlet type) that came with this product, make sure the connector is securely inserted in the inlet of the product.  
When securing measure is provided, secure the cord with the fixture properly.  
If the power cord (inlet type) is not connected to the product securely, a contact problem may lead to increased resistance, overheating, and risk of fire.



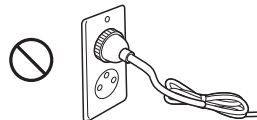
- Check whether the power cord is not stepped on or pinched by a table and so on.  
Overheating may occur there, leading to a risk of fire.



- Check whether the power cord is damaged. Check whether the sheath is damaged.  
If the power plug, cord, or sheath is damaged, replace with a new power cord or cord set (with plug and connector on each end) specified by KMBT.  
Using the damaged power cord may result in fire or electric shock.



- Do not bundle or tie the power cord.  
Overheating may occur there, leading to a risk of fire.

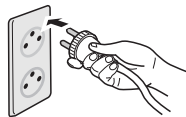


## Power Plug and Cord

### WARNING

- Check whether dust is collected around the power plug and wall outlet.

Using the power plug and wall outlet without removing dust may result in fire.



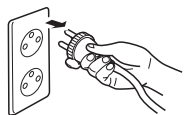
- Do not insert the power plug into the wall outlet with a wet hand.

The risk of electric shock exists.



- When unplugging the power cord, grasp the plug, not the cable.

The cable may be broken, leading to a risk of fire and electric shock.

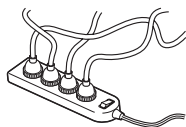


## Wiring

### WARNING

- Never use multi-plug adapters to plug multiple power cords in the same outlet.

If used, the risk of fire exists.



- When an extension cord is required, use a specified one. Current that can flow in the extension cord is limited, so using a too long extension cord may result in fire.

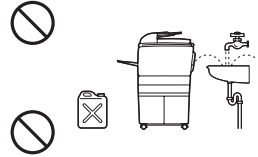
Do not use an extension cable reel with the cable taken up. Fire may result.



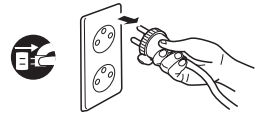
## 2. Installation Requirements

**Prohibited Installation Places****⚠ WARNING**

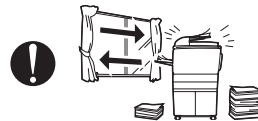
- Do not place the product near flammable materials or volatile materials that may catch fire.  
A risk of fire exists.
- Do not place the product in a place exposed to water such as rain.  
A risk of fire and electric shock exists.

**When not Using the Product for a long time****⚠ WARNING**

- When the product is not used over an extended period of time (holidays, etc.), switch it off and unplug the power cord.  
Dust collected around the power plug and outlet may cause fire.

**Ventilation****⚠ CAUTION**

- The product generates ozone gas during operation, but it will not be harmful to the human body.  
If a bad smell of ozone is present in the following cases, ventilate the room.
  - When the product is used in a poorly ventilated room
  - When taking a lot of copies
  - When using multiple products at the same time

**Fixing****⚠ CAUTION**

- Be sure to lock the caster stoppers.  
In the case of an earthquake and so on, the product may slide, leading to a injury.

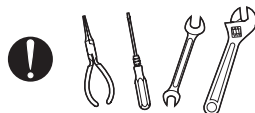


## 3. Servicing

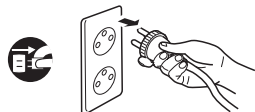
**Inspection before Servicing****⚠ CAUTION**

- Before conducting an inspection, read all relevant documentation (service manual, technical notices, etc.) and proceed with the inspection following the prescribed procedure in safety clothes, using only the prescribed tools. Do not make any adjustment not described in the documentation.

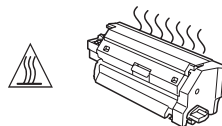
If the prescribed procedure or tool is not used, the product may break and a risk of injury or fire exists.



- Before conducting an inspection, be sure to disconnect the power plugs from the product and options. When the power plug is inserted in the wall outlet, some units are still powered even if the POWER switch is turned OFF. A risk of electric shock exists.



- The area around the fixing unit is hot. You may get burnt.

**Work Performed with the Product Powered On****⚠ WARNING**

- Take every care when making adjustments or performing an operation check with the product powered.

If you make adjustments or perform an operation check with the external cover detached, you may touch live or high-voltage parts or you may be caught in moving gears or the timing belt, leading to a risk of injury.



- Take every care when servicing with the external cover detached.

High-voltage exists around the drum unit. A risk of electric shock exists.



## Safety Checkpoints

### **WARNING**

- When taking a report of problems from a user, check each part and repair properly.

A risk of product trouble, injury, and fire exists.



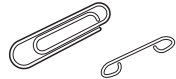
- Check the exterior and frame for edges, burrs, and other damages.

The user or CE may be injured.



- Do not allow any metal parts such as clips, staples, and screws to fall into the product.

They can short internal circuits and cause electric shock or fire.



- Check wiring for squeezing and any other damage.

Current can leak, leading to a risk of electric shock or fire.



- Carefully remove all toner remnants and dust from electrical parts and electrode units such as a charging corona unit.

Current can leak, leading to a risk of product trouble or fire.



- Check high-voltage cables and sheaths for any damage.

Current can leak, leading to a risk of electric shock or fire.



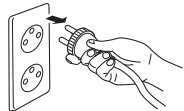
- Check electrode units such as a charging corona unit for deterioration and sign of leakage.

Current can leak, leading to a risk of trouble or fire.



- Before disassembling or adjusting the write unit (P/H unit) incorporating a laser, make sure that the power cord has been disconnected.

The laser light can enter your eye, leading to a risk of loss of eyesight.



- Do not remove the cover of the write unit. Do not supply power with the write unit shifted from the specified mounting position.

The laser light can enter your eye, leading to a risk of loss of eyesight.





## Safety Checkpoints

### WARNING

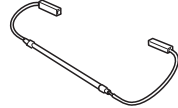
- When replacing a lithium battery, replace it with a new lithium battery specified in the Parts Guide Manual. Dispose of the used lithium battery using the method specified by local authority.

Improper replacement can cause explosion.



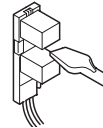
- After replacing a part to which AC voltage is applied (e.g., optical lamp and fixing lamp), be sure to check the installation state.

A risk of fire exists.



- Check the interlock switch and actuator for loosening and check whether the interlock functions properly.

If the interlock does not function, you may receive an electric shock or be injured when you insert your hand in the product (e.g., for clearing paper jam).



- Make sure the wiring cannot come into contact with sharp edges, burrs, or other pointed parts.

Current can leak, leading to a risk of electric shock or fire.



- Make sure that all screws, components, wiring, connectors, etc. that were removed for safety check and maintenance have been reinstalled in the original location. (Pay special attention to forgotten connectors, pinched cables, forgotten screws, etc.)

A risk of product trouble, electric shock, and fire exists.



## Handling of Consumables

### WARNING

- Toner and developer are not harmful substances, but care must be taken not to breathe excessive amounts or let the substances come into contact with eyes, etc. It may be stimulative.

If the substances get in the eye, rinse with plenty of water immediately. When symptoms are noticeable, consult a physician.



## Handling of Consumables

### WARNING

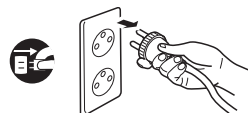
- Never throw the used cartridge and toner into fire.  
You may be burned due to dust explosion.



## Handling of Service Materials

### CAUTION

- Unplug the power cord from the wall outlet.  
Isopropyl alcohol and acetone are highly flammable and must be handled with care. A risk of fire exists.



- Do not replace the cover or turn the product ON before any solvent remnants on the cleaned parts have fully evaporated.  
A risk of fire exists.



- Use only a small amount of cleaner at a time and take care not to spill any liquid. If this happens, immediately wipe it off.  
A risk of fire exists.



- When using any solvent, ventilate the room well.  
Breathing large quantities of organic solvents can lead to discomfort.



#### 4. Fuse

### Fuse

### CAUTION

- CAUTION  
Double pole / neutral fusing
- ATTENTION  
Double pôle / Fusible sur le neutre

## 5. Used Batteries Precautions

**Handling of batteries****CAUTION**

## • ALL Areas

**CAUTION**

Danger of explosion if battery is incorrectly replaced.

Replace only with the same or equivalent type recommended by the manufacturer.

Dispose of used batteries according to the manufacturer's instructions.

## • Germany

**VORSICHT!**

Explosionsgefahr bei unsachgemäßem Austausch der Batterie.

Ersatz nur durch denselben oder einen vom Hersteller empfohlenen gleichwertigen Typ.

Entsorgung gebrauchter Batterien nach Angaben des Herstellers.

## • France

**ATTENTION**

Il y a danger d'explosion s'il y a remplacement incorrect de la batterie.

Remplacer uniquement avec une batterie du même type ou d'un type équivalent recommandé par le constructeur.

Mettre au rebut les batteries usagées conformément aux instructions du fabricant.

## • Denmark

**ADVARSEL!**

Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering.

Udskiftning må kun ske med batteri af samme fabrikat og type.

Levér det brugte batteri tilbage til leverandøren.

## • Finland, Sweden

**VAROITUS**

Paristo voi räjähtää, jos se on virheellisesti asennettu.

Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin.

Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

**VARNING**

Explosionsfara vid felaktigt batteribyte.

Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren.

Kassera använt batteri enligt fabrikantens instruktion.

## • Norway

**ADVARSEL**

Eksplosjonsfare ved feilaktig skifte av batteri.

Benytt samme batteritype eller en tilsvarende type anbefalt av apparatfabrikanten.

Brukte batterier kasseres i henhold til fabrikantens instruksjoner.

## **SAFETY INFORMATION**

### **IMPORTANT NOTICE**

The Center for Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration implemented regulations for laser products manufactured since August 1, 1976. Compliance is mandatory for products marketed in the United States.

This copier is certified as a "Class 1" laser product under the U.S. Department of Health and Human Services (DHHS) Radiation Performance Standard according to the Radiation Control for Health and Safety Act of 1968. Since radiation emitted inside this copier is completely confined within protective housings and external covers, the laser beam cannot escape during any phase of normal user operation.

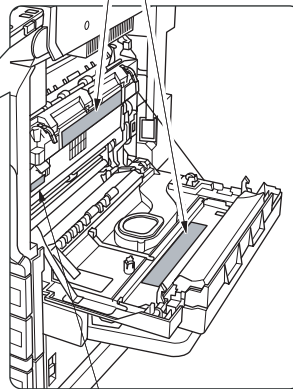
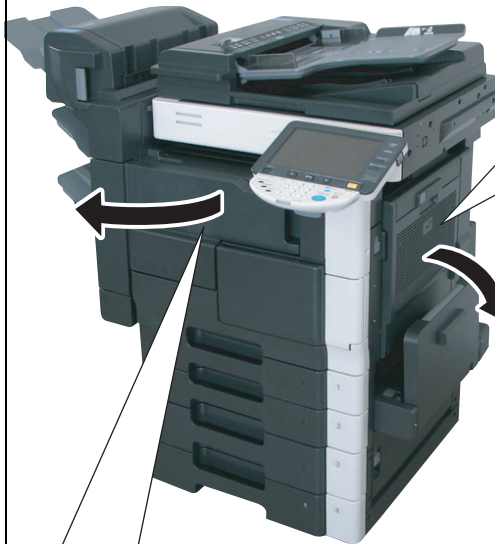
## INDICATION OF WARNING ON THE MACHINE

Caution labels shown below are attached in some areas on/in the machine.  
When accessing these areas for maintenance, repair, or adjustment, special care should be taken to avoid burns and electric shock.

### ⚠ CAUTION

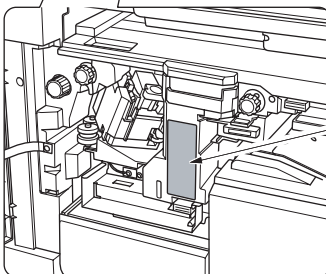
The fixing unit is very hot.  
To avoid getting burned DO NOT TOUCH.

⚠ CAUTION	⚠ VORSICHT	⚠ ATTENTION	⚠ PRECAUCIÓN	⚠ CUIDADO
High Temperature!	Heiße Oberfläche!	Température élevée!	Temperatura alta!	Alta temperatura!
⚠ ATTENZIONE	⚠ تحذير	⚠ 注意	⚠ 注意	⚠ 주의
Alta temperatura!	⚠ خطر الحرارة	⚠ 高温!	⚠ 高温!	⚠ 고온!



### ⚠ CAUTION

This area generates high voltage. If touched, electrical shock may occur. DO NOT TOUCH!



Finisher FS-522



### ⚠ CAUTION

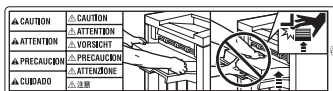
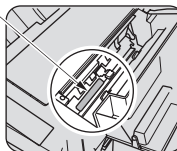
The area opened by the conveyance lever is very hot. To avoid getting burned DO NOT TOUCH.

50gap0e001nb



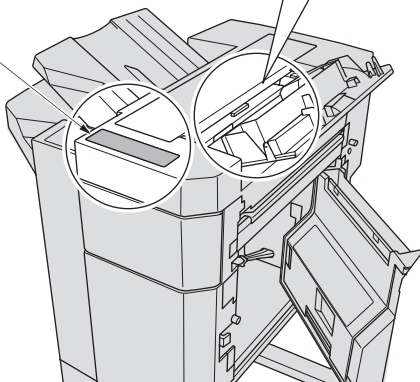
### ⚠ CAUTION

This area is very hot.  
To avoid getting  
burned DO NOT  
TOUCH.



### ⚠ CAUTION

To avoid injury, DO NOT put your hand on the top of the printed sheets. Be sure to hold both sides of the printed sheets when removing them, and DO NOT leave your hand on the printed sheets while the tray 2 (primary tray) goes up.



Finisher FS-523

50gap0e002nb

### ⚠ CAUTION:

- You may be burned or injured if you touch any area that you are advised by any caution label to keep yourself away from. Do not remove caution labels. And also, when the caution label is peeled off or soiled and cannot be seen clearly, replace it with a new caution label.

## **MEASURES TO TAKE IN CASE OF AN ACCIDENT**

1. If an accident has occurred, the distributor who has been notified first must immediately take emergency measures to provide relief to affected persons and to prevent further damage.
2. If a report of a serious accident has been received from a customer, an on-site evaluation must be carried out quickly and KMBT must be notified.
3. To determine the cause of the accident, conditions and materials must be recorded through direct on-site checks, in accordance with instructions issued by KMBT.
4. For reports and measures concerning serious accidents, follow the regulations specified by every distributor.

# Legal restrictions on copying

Certain types of originals must never be copied with the purpose or intent to pass copies of such originals off as the originals.

The following is not a complete list, but is meant to be used as a guide to responsible copying.

## <Financial Instruments>

- Personal checks
- Traveler's checks
- Money orders
- Certificates of deposit
- Bonds or other certificates of indebtedness
- Stock certificates

## <Legal Originals>

- Food stamps
- Postage stamps (canceled or uncanceled)
- Checks or drafts drawn by government agencies
- Internal revenue stamps (canceled or uncanceled)
- Passports
- Immigration papers
- Motor vehicle licenses and titles
- House and property titles and deeds

## <General>

- Identification cards, badges, or insignias
- Copyrighted works without permission of the copyright owner

In addition, it is prohibited under any circumstances to copy domestic or foreign currencies, or works of art without permission of the copyright owner.

When in doubt about the nature of an original, consult with legal counsel.

## **Detail**

In order to prohibit the illegal reproduction of certain originals, such as paper currency, this machine is equipped with a counterfeit prevention feature.

Due to the counterfeit prevention feature that this machine is equipped with, images may be distorted.



# Composition of the service manual

This service manual consists of the following sections and chapters:

## <Theory of Operation section>

OUTLINE:	System configuration, product specifications, unit configuration, and paper path
COMPOSITION/OPERATION:	Configuration of each unit, explanation of the operating system, and explanation of the control system

This section gives, as information for the CE to get a full understanding of the product, a rough outline of the object and role of each function, the relationship between the electrical system and the mechanical system, and the timing of operation of each part.

## <Field service section>

OUTLINE:	System configuration, and product specifications
MAINTENANCE:	Service schedule *, maintenance steps, list of service tools and directions for use *, firmware version up method *, and removal/reinstallation methods of major parts
ADJUSTMENT/SETTING:	Utility mode *, service mode *, security and mechanical adjustment
TROUBLESHOOTING*:	List of jam codes, their causes, operation when a jam occurs and its release method, and list of error codes, their causes, operation when a warning is issued and esti- mated abnormal parts.
APPENDIX*:	Parts layout drawings, connector layout drawings, timing chart, overall layout drawing

This section gives, as information required by the CE at the site (or at the customer's premise), a rough outline of the service schedule and its details, maintenance steps, the object and role of each adjustment, error codes and supplementary information.

**The details of items with an asterisk "\*" are described only in the service manual of the main body.**

# Notation of the service manual

## A. Product name

In this manual, each of the products is described as follows:

(1) IC board:	Standard printer
(2) bizhub 501/421/361:	Main body
(3) Microsoft Windows 95:	Windows 95
Microsoft Windows 98:	Windows 98
Microsoft Windows Me:	Windows Me
Microsoft Windows NT 4.0:	Windows NT 4.0 or Windows NT
Microsoft Windows 2000:	Windows 2000
Microsoft Windows XP:	Windows XP
Microsoft Windows Vista:	Windows Vista
When the description is made in combination of the OS's mentioned above:	
Windows 95/98/Me	
Windows NT 4.0/2000	
Windows NT/2000/XP	
Windows 95/98/Me/NT/2000/XP	

## B. Brand name

The company names and product names mentioned in this manual are the brand name or the registered trademark of each company.

## C. Electrical parts and signals

Those listed by way of example below are not exhaustive, but only some instances among many.

Classification	Load symbol	Ex. of signal name	Description
Sensor	PS	IN	Sensor detection signal
		PS	
		Door PS1	
		SIG	
		102 PS	
Solenoid	SD	24V	Power to drive the solenoid
		DRV	Drive signal
		SOL	
Clutch	CL	24V	Power to drive the clutch
		DRV	Drive signal
		SOL	

Classification	Load symbol	Ex. of signal name	Description
Motor	M	24V	Power to drive the motor
		CONT	Drive signal
		DRV1	Drive signals of two kinds
		DRV2	
		D1	
		D2	
Motor	M	_U	Drive signals (control signals) of three kinds
		_V	
		_W	
		DRV1	
		DRV2	
		DRV3	
		D1	Drive signals (control signals) of four kinds Motor, phases A and B control signals
		D2	
		D3	
		D4	
		DRV A	
		DRV $\bar{A}$	
		DRV B	
		DRV $\bar{B}$	
		A	
		/A	
		B	PLL control signal
		/B	
		AB	
		BB	
		CLK, PLL	
		LCK, Lock, LD	
		FR	
		EM, Lock, LCK, LD	
		BLK	
		P/S	
		S/S	Operating load start/stop signal
		SS	
		CW/CCW, F/R	Rotational direction switching signal
		ENB	Effective signal
		TEMP_ER	Motor temperature abnormality detection signal
Fan	FM	24V	Power to drive the fan motor
		CONT, DRIVE	Drive signal
		HL	Speed control signal (2 speeds)
		EM, Lock, LCK, FEM	Detection signal
Others		TH1.S, ANG	Analog signal

Classification	Load symbol	Ex. of signal name	Description
Ground		SG, S.GND, S_GND	Signal ground
		PG, P.GND	Power ground
Serial communication		DCD	Data carrier detection
		SIN	Serial input
		SOUT	Serial output
		DTR	Data terminal operation available
		GND	Signal ground (earth)
		DSR, DSET	Data set ready
		RTS	Transmission request signal
		CTS	Consent transmission signal
		RI	Ring indicator
		TXD	Serial transmission data
		RXD	Serial reception data

#### D. Feeding direction

- When the long side of the paper is parallel with the feeding direction, it is called short edge feeding. The feeding direction which is perpendicular to the short edge feeding is called the long edge feeding.
- Short edge feeding will be identified with [S (abbreviation for Short edge feeding)] on the paper size. No specific notation is added for the long edge feeding.  
When the size has only the short edge feeding with no long edge feeding, [S] will not be added to the paper size.

<Sample notation>

Paper size	Feeding direction	Notation
A4	Long edge feeding	A4
	Short edge feeding	A4S
A3	Short edge feeding	A3

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KONICA MINOLTA

## SERVICE MANUAL

Theory of Operation

---

# **bizhub**

## **501/421/361**





### **Main body**

# Revision history

After publication of this service manual, the parts and mechanism may be subject to change for improvement of their performance.  
Therefore, the descriptions given in this service manual may not coincide with the actual machine.

When any change has been made to the descriptions in the service manual, a revised version will be issued with a revision mark added as required.


Revision mark:

- To indicate clearly a section revised,  is shown at the left margin of the revised section.  
The number inside  represents the number of times the revision has been made.
- To indicate clearly a page that contains the revision,  is shown near the page number of the corresponding page.  
The number inside  represents the number of times the revision has been made.

**NOTE**

Revision marks shown in a page are restricted only to the latest ones with the old ones deleted.

- When a page revised in Ver. 2.0 has been changed in Ver. 3.0:  
The revision marks for Ver. 3.0 only are shown with those for Ver. 2.0 deleted.
- When a page revised in Ver. 2.0 has not been changed in Ver. 3.0:  
The revision marks for Ver. 2.0 are left as they are.

2009/03	2.0		Revision due to the addition of a new optional unit (LK)
2008/05	1.0	—	Issue of the first edition
Date	Service manual Ver.	Revision mark	Descriptions of revision

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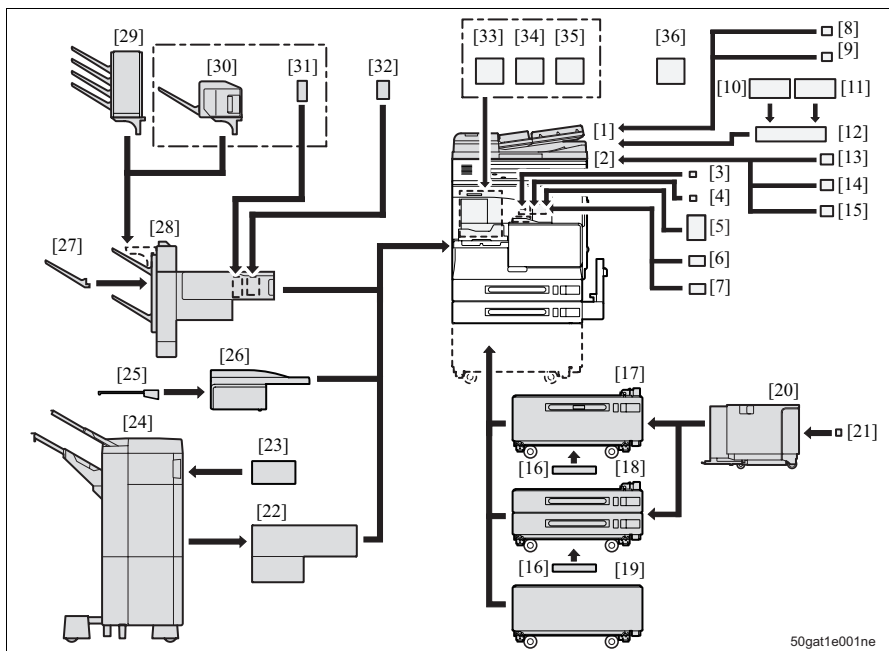
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# ■ OUTLINE

## 1. SYSTEM CONFIGURATION

### A. System configuration



- |   |   |   |  |
|---|---|---|--|
|   | [1] Reverse automatic document feeder (DF-613) (standard equipment) |   | [19] Desk (DK-506)                     |
|   | [2] Main body   |   | [20] Large capacity unit (LU-203)      |
|   | [3] Image controller (IC-207)                                       |   | [21] Dehumidifier heater *2            |
| △ | [4] Upgrade kit (UK-202)  |   | [22] Relay unit (RU-507)               |
|   | [5] Local Interface Kit (EK-703)                                    |   | [23] Swedish punch kit G *3            |
|   | [6] Hard disk (HD-509)  |   | [24] Finisher (FS-523)                 |
| △ | [7] Security kit (SC-505)   |   | [25] Job separator (JS-502)            |
|   | [8] Stamp unit (SP-501)   |   | [26] Output tray kit (OT-504)          |
|   | [9] Spare TX marker stamp 2   |   | [27] Output tray (OT-602)              |
|   | [10] Authentication unit (Biometric type) (AU-101)                  |   | [28] Finisher (FS-522)                 |
|   | [11] Authentication unit (IC card type: AU-201)                     |   | [29] Mail bin kit (MT-502)             |
|   | [12] Working table (WT-502)   |   | [30] Saddle stitcher (SD-507)          |
|   | [13] Key counter kit 4 *1   |   | [31] Folding unit (included in SD-507) |
|   | [14] Key counter *1   |   | [32] Punch unit (PU-501)               |
|   | [15] Key counter mount kit *1                                       |   | [33] FAX kit (FK-502)                  |
|   | [16] Dehumidifier heater 1C   |   | [34] Mount kit (MK-708)                |
|   | [17] Paper feed cabinet (PC-407)                                    | △ | [35] FAX multi line (ML-503)           |
|   | [18] Paper feed cabinet (PC-206)                                    |   | [36] i-option (LK-101/102/103) *4      |
- \*1 See "6.4 Option counter" in Field Service bizhub 501/421/361 main body for details.
- \*2 Dehumidifier heater is set up as service part.
- \*3 Swedish punch kit G is for Europe only.
- △ \*4 Upgrade kit (UK-202) is needed for using i-option.

**B. Configuration for optional device connection****Note**

- Any combination other than those listed below is not available.

No.	Combinations for paper feeding		Combinations for finishing		Remarks
1	DK-506/PC-206/PC-407 *1		OT-504		
2	DK-506/PC-206/PC-407 *1		OT-504	JS-502	
3	DK-506/PC-206/PC-407 *1		RU-507 + FS-523		
4	DK-506/PC-206/PC-407 *1		FS-522 *2*3		
5	DK-506/PC-206/PC-407 *1		FS-522 *2*3	SD-507	
6	DK-506/PC-206/PC-407 *1		FS-522 *2*3	MT-502	
7	PC-206/PC-407 *4	LU-203	OT-504		
8	PC-206/PC-407 *4	LU-203	OT-504	JS-502	
9	PC-206/PC-407 *4	LU-203	RU-507 + FS-523		
10	PC-206/PC-407 *4	LU-203	FS-522 *2*3		
11	PC-206/PC-407 *4	LU-203	FS-522 *2*3	SD-507	
12	PC-206/PC-407 *4	LU-203	FS-522 *2*3	MT-502	

\*1 Either one of DK-506, PC-206 and PC-407 can be selected.

\*2 FS-522 can be installed optionally with OT-602.

\*3 FS-522 can be installed optionally with PU-501.

\*4 Either one of PC-206 and PC-407 can be selected.

## 2. PRODUCT SPECIFICATIONS

### A. Type

Type	Desktop type	
Copying method	Indirect electrostatic method	
Original stand	Fixed	
Original alignment	Left rear standard	
Photo conductor	OPC	
Sensitizing method	Laser writing	
Paper feed trays	Two trays	500 sheet x 2, 80g/m <sup>2</sup>
	Bypass feed	150 sheet x 1, 80g/m <sup>2</sup>
	PC-407 *1	2,500 sheet x 1, 80g/m <sup>2</sup>
	PC-206 *1	500 sheet x 2, 80g/m <sup>2</sup>
	LU-203 *1	2,000 sheet x 1, 80g/m <sup>2</sup>

\*1    PC-407, PC-206, and LU-203 are optional.

**B. Functions**

Original	Sheet, book, solid object	
Max. original size	A3 or 11 x 17	
Copy size	Trays 1, 2	Inch: 11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S, 5½ x 8½S, A3, A4, A4S, Foolscap Metric: A3, B4, A4, A4S, B5, A5S, 11 x 17, 8½ x 11, 8½ x 11S, Foolscap, 8K *1, 16K *1
	Bypass feed	Inch: 11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S, 5½ x 8½S, A4, Custom paper (Max. 297.0 x 431.8mm, Min. 92.0 x 148.0 mm) Metric: A3, B4, A4, A4S, B5, B5S *2, A5S, B6S, 11 x 17 *2, 8½ x 11, 8½ x 11S, Foolscap, 8K *1, 16K *1, 16KS *1, Custom paper (Max. 297.0 x 431.8mm, Min. 92.0 x 148.0 mm)
	ADU	Inch: 11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S, 5½ x 8½S, A3, A4, A4S, Foolscap Metric: A3, B4, A4, A4S, B5, B5S *2, A5S, 11 x 17, 8½ x 11, 8½ x 11S, Foolscap, 8K *1, 16K *1, 16KS *1
Magnification	Fixed magnification	Inch: x 1.000, x 1.214, x 1.294, x 1.545, x 2.000 x 0.500, x 0.647, x 0.772, x 0.785 Metric: x 1.000, x 1.154, x 1.224, x 1.414, x 2.000 x 0.500, x 0.707, x 0.816, x 0.866
	Special magnification setting	x 0.930
	Preset zoom setting	3 types
	Zoom magnification	x 0.25 to x 4.00 (at the step of 0.1%)
	Vertical magnification	x 0.25 to x 4.00 (at the step of 0.1%)
	Horizontal magnification	x 0.25 to x 4.00 (at the step of 0.1%)
Warm-up time	60 seconds or less (bizhub 501) 30 seconds or less (bizhub 421/361)	
First copy out time	3.2 seconds or less (bizhub 501) 3.6 seconds or less (bizhub 421/361)	
Continuous copy speed	50 copies /min. (A4 / 8½ x 11) (bizhub 501) 42 copies /min. (A4 / 8½ x 11) (bizhub 421) 36 copies /min. (A4 / 8½ x 11) (bizhub 361)	
Continuous copy count	Up to 999 sheets	
Original density selection	Auto density selection, Manual (9 steps), Manual underprint density (9 steps)	

\*1 Only supported in Taiwan.

\*2 Supported in other than inch area and Taiwan.



	Resolution	Scan	600 x 600 dpi
		Write	600 x 600 dpi
△	Image memory	205 MB	
△	Interface section	RJ45 Ethernet, Serial port (RS232-C), Serial port (USB TypeA x 3), Serial port (USB TypeB) *1, RJ-11 *2	
△	*1	When EK-703 is optionally installed.	
△	*2	1 port when MK-708 and FK-502 are optionally installed. 2 ports when MK-708, ML-503 and FK-502 x 2 are optionally installed.	

### C. Type of paper

Plain paper *1	All trays	High quality paper of 60 to 105 g/m <sup>2</sup>
Special paper *2	Bypass feed only	OHP film, label paper *3, blueprint master paper *3
		High quality paper of 50 to 59 g/m <sup>2</sup> (thin paper)
	All trays	High quality paper of 91 to 105 g/m <sup>2</sup> (thick paper)
	Bypass feed only	High quality paper of 106 to 210 g/m <sup>2</sup> (thick paper)

#### \*1 Standard specified paper

Plain paper:	Inch:	Hammermill Tidal MP (20 lbs)
	Metric:	Konica Minolta Profi (80 g/m <sup>2</sup> )
Recycle paper:	Inch:	Hammmerrmill Bond (20lbs), Domtar Recycled Copy (20lbs)
	Metric:	Nautilus (80 g/m <sup>2</sup> )

#### \*2 Special paper/recommended paper

Thick paper:	Inch:	Cougar Cover 65 lb
	Metric:	Xerox colotech 200 g/m <sup>2</sup>
Thin paper:	Inch:	Boise Cascade Bond 16 lbs
Label paper:	Inch:	AVERY 5352
	Metric:	AVERY DPS 24
OHP film:	Inch:	3M CG3700
	Metric:	Folex overhead X-500, 3M CG3700
Envelope:	Inch:	Preservation Wove (24 lbs) #6-3/4, #9, #10 (4-1/8 x 9-1/2)
	Metric:	Schneider Soehne Distinction 100 (100 g/m <sup>2</sup> ) #lang
		Schneider Soehne Briefumschlage (100 g/m <sup>2</sup> ) #C5 Schneider Soehne Velin 80White (80g/m <sup>2</sup> ) #C6

#### \*3 Label paper is loaded and fed one sheet at a time.

### D. Maintenance

Maintenance	Every 250,000 prints (bizhub 501/421) Every 225,000 prints (bizhub 361)
-------------	--

E. Machine data

Power source	Inch: AC120V 12A, 60Hz Metric: AC220-240V 7A, 50Hz	
Maximum power consumption	1,560 W or less (full system)	
Dimensions	Main body + DF-613 + PC or DK	685 (W) x 823.7 (D) x 1,150 (H) mm *1
Weight	Approx. 97 kg (with DF-613 provided)	

\*1    Overturning prevention board is not included.

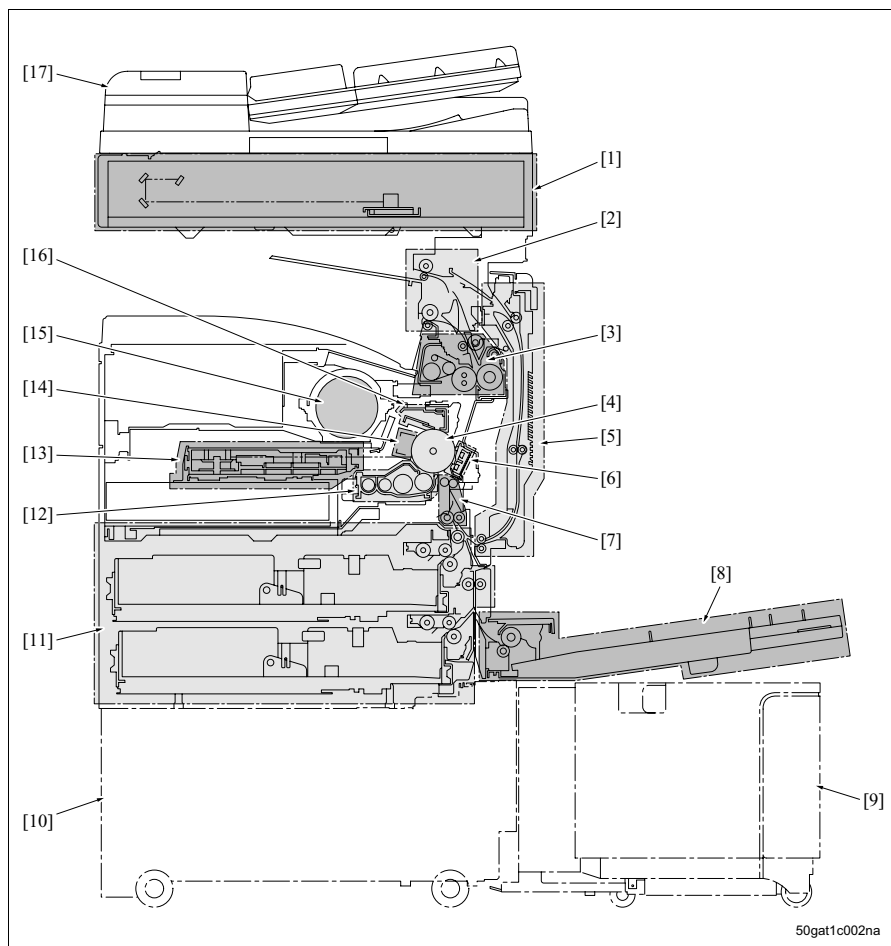
F. Operating environment

Temperature	10 to 30 °C
Humidity	10 to 80%RH (with no condensation)

Note

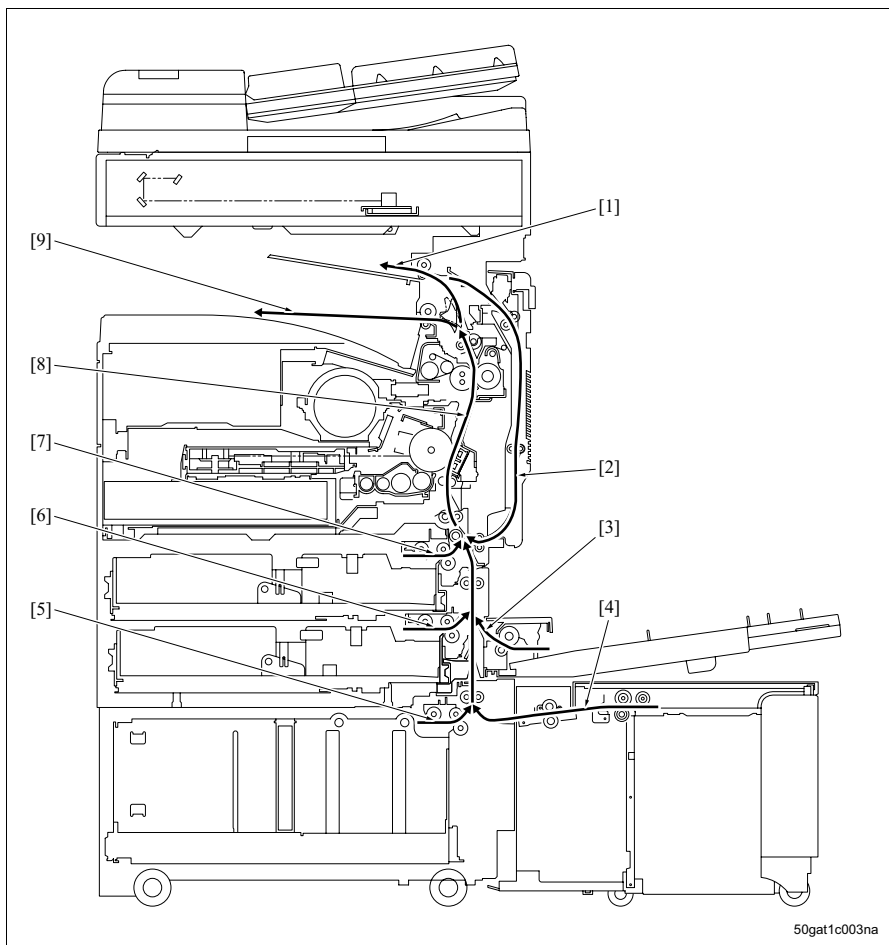
- The information herein may be subject to change for improvement without notice.

### 3. UNIT CONFIGURATION



- |                                 |                                     |
|---------------------------------|-------------------------------------|
| [1] Scanner section             | [10] PC or DK (option)              |
| [2] Paper reverse/exit section  | [11] Paper feed section (tray 1/2)  |
| [3] Fusing section              | [12] Developing section             |
| [4] Photo conductor section     | [13] Writing section                |
| [5] ADU                         | [14] Charging section               |
| [6] Transfer/separation section | [15] Toner supply section           |
| [7] Registration section        | [16] Cleaning/toner recycle section |
| [8] Bypass tray section         | [17] DF                             |
| [9] LU (option)                 |                                     |

## 4. PAPER PATH



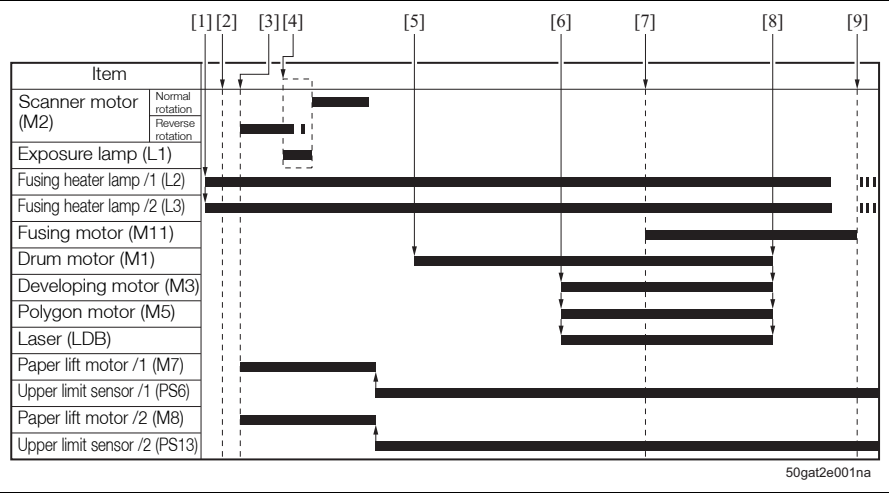
- |                        |                             |
|------------------------|-----------------------------|
| [1] Reverse conveyance | [6] Tray 2 paper feed       |
| [2] ADU conveyance     | [7] Tray 1 paper feed       |
| [3] Bypass paper feed  | [8] Registration conveyance |
| [4] LU paper feed      | [9] Paper exit              |
| [5] PC paper feed      |                             |

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■ COMPOSITION/OPERATION

5. OVERALL CONFIGURATION

5.1 Time chart when the power is turned ON



- [1] Fusing heater lamps /1 (L2) and /2 (L3) turn ON early

[2] Power switch (SW2) turns ON

[3] Initial communication between the overall control board (OACB) and the printer control board (PRCB)

[4] Shading correction
- [5] Drum motor (M1) turns ON

[6] Dot diameter adjustment starts

[7] The fusing temperature gets to the pre-scribed temperature to start the preliminary rotation for fusing

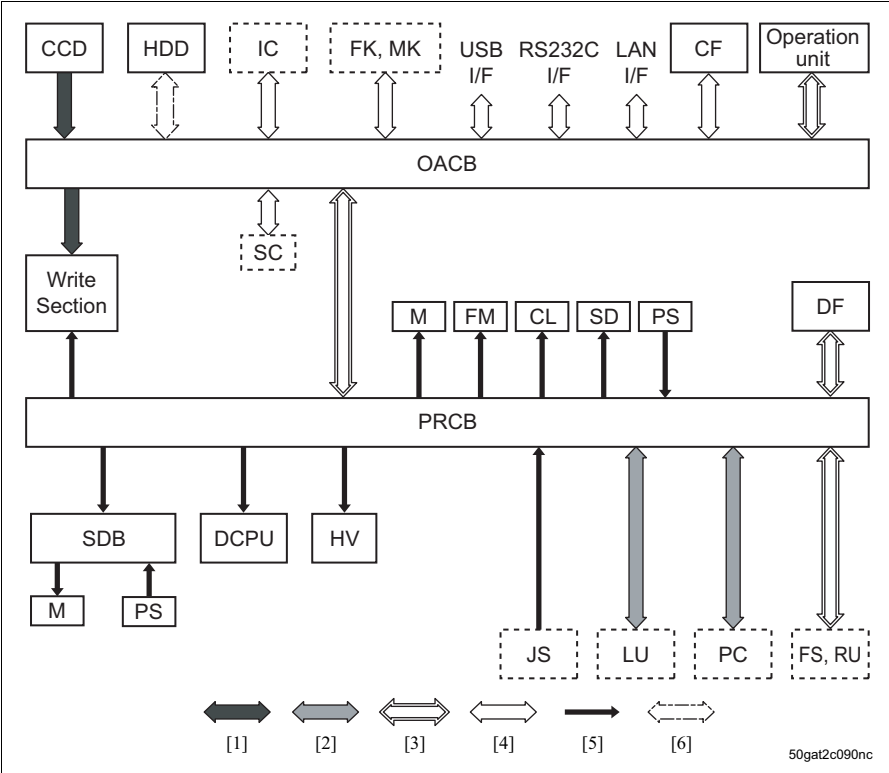
[8] Dot diameter adjustment completed

[9] Warming up completed

**Note**

- Each operation varies according to the setting of the software DipSW in the service mode.
- The power is turned ON with DF closed.
- The power is turned ON with the lift plate of the tray down.

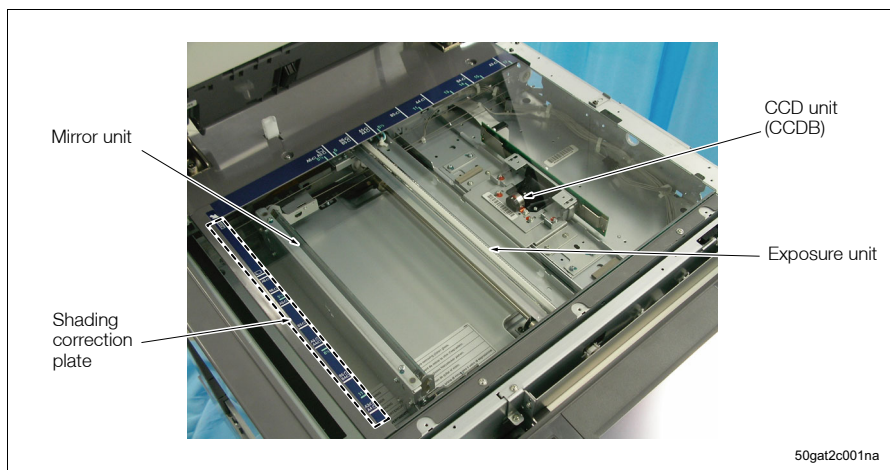
5.2 Control block diagram



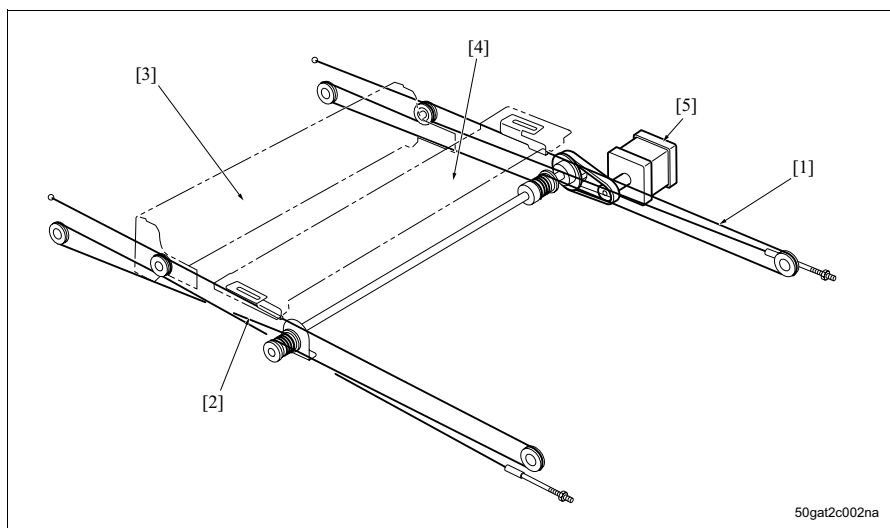
- |                                  |                            |
|----------------------------------|----------------------------|
| [1] Image bus                    | [4] Other buses            |
| [2] Clock synchronous serial bus | [5] Individual signal line |
| [3] UART bus                     | [6] SATA                   |

## 6. SCANNER SECTION

### 6.1 Composition



### 6.2 Drive



- [1] Scanner wire /Rr
- [2] Scanner wire /Fr
- [3] V-mirror unit

- [4] Exposure unit
- [5] Scanner motor (M2)



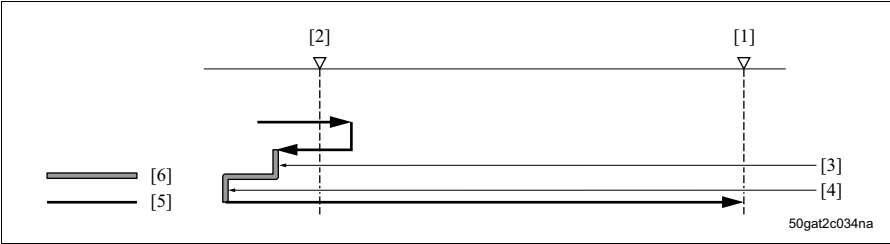
6.3 Operation

6.3.1 Scan/exposure lamp control

A. Operation when the power is turned ON

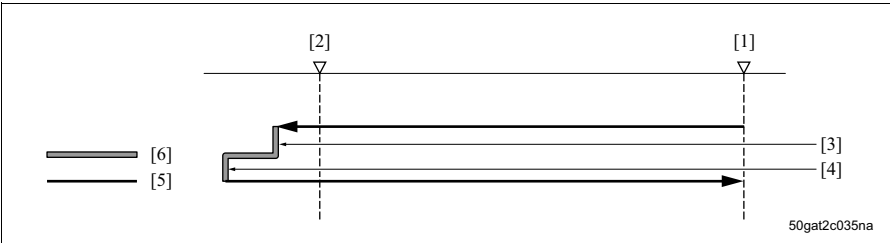
A specified period of time after the power switch (SW2) is turned on, the exposure unit conducts the home position search. At this time, the exposure unit conducts the shading correction based on the white reference board attached to the original glass. For shading correction, 2 places on the white reference board are read for correction. The home position search varies according to the ON/OFF condition of the scanner home sensor (PS30) when SW2 is turned ON.

(1) Home position search while in PS30 ON



- |                                     |                                   |
|-------------------------------------|-----------------------------------|
| [1] Exposure unit stand-by position | [4] Shading correction position 2 |
| [2] Scanner home sensor (PS30)      | [5] Movement of the exposure unit |
| [3] Shading correction position 1   | [6] Exposure lamp (L1) ON         |

(2) Home position search while in PS30 OFF



- |                                     |                                   |
|-------------------------------------|-----------------------------------|
| [1] Exposure unit stand-by position | [4] Shading correction position 2 |
| [2] Scanner home sensor (PS30)      | [5] Movement of the exposure unit |
| [3] Shading correction position 1   | [6] Exposure lamp (L1) ON         |

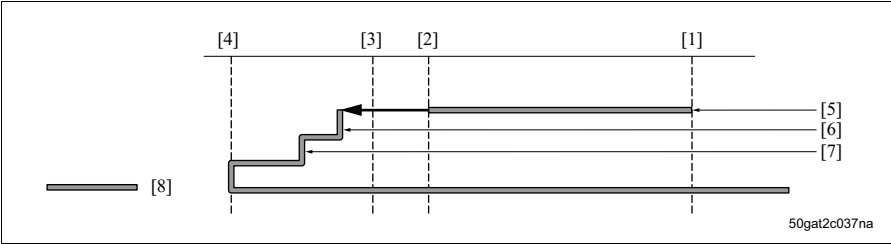
### B. Operation when the start key is turned ON

For the original read mode, the following two types are available: the platen mode and the DF mode. While in the platen mode, the exposure unit scans the original for reading. And while in the DF mode, since DF conveys the original, the exposure unit remains at the prescribed position (DF read position) to read the original.

#### (1) When the platen is used (when DF is opened)

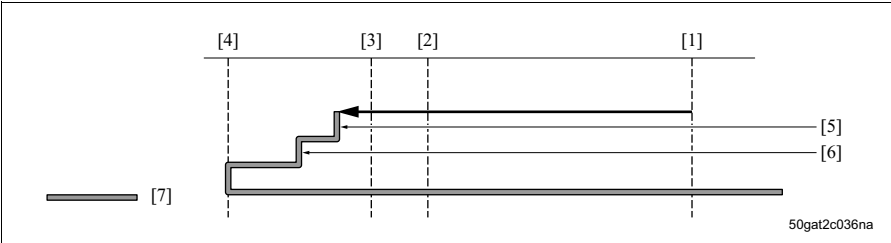
The operation in the platen mode varies depending on which is selected for the print density, the AE print and the manual print.

- When the AE print is selected



- |  |                                   |
|--|-----------------------------------|
| [1] Exposure unit stand-by position                                  | [5] AE scan range                 |
| [2] Position at which the image read is started                      | [6] Shading correction position 1 |
| [3] Scanner home sensor (PS30)                                       | [7] Shading correction position 2 |
| [4] Position at which the running-up of the exposure unit is started | [8] Exposure lamp (L1) ON         |

- When the manual print is selected

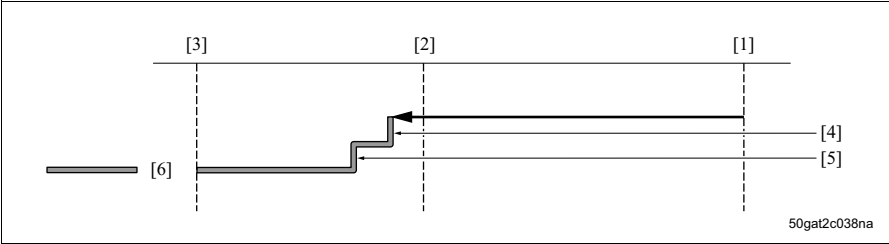


- |  |                                   |
|--|-----------------------------------|
| [1] Exposure unit stand-by position                                  | [5] Shading correction position 1 |
| [2] Position at which the image read is started                      | [6] Shading correction position 2 |
| [3] Scanner home sensor (PS30)                                       | [7] Exposure lamp (L1) ON         |
| [4] Position at which the running-up of the exposure unit is started |                                   |

#### Note

- When the tray 1 is selected by manual, not by APS, no shading correction is made.

(2) When DF is used (when DF is closed)



- |     |                                 |     |                               |
|-----|---------------------------------|-----|-------------------------------|
| [1] | Exposure unit stand-by position | [4] | Shading correction position 1 |
| [2] | Scanner home sensor (PS30)      | [5] | Shading correction position 2 |
| [3] | DF read position                | [6] | Exposure lamp (L1) ON         |

### 6.3.2 Original size detection control

#### A. Detection method

The original size detection method varies for the DF mode and the platen mode.

##### (1) DF mode

See DF-613 Service Manual.

##### (2) Platen mode

- Main scan direction

Reading is made by the CCD sensor.

- Sub-scan direction

Detection is made according to the ON/OFF of the APS sensor (PS32).

Original size	CCD sensor (Detection length: mm)	PS32 (ON/OFF)
A3	297	ON
11 x 17	279.4	ON
B4	257	ON
8½ x 14 *1	215.9	ON
8½ x 11S	215.9	ON
A4S	210	ON
A4	297	OFF
8½ x 11	279.4	OFF
B5	257	OFF
A5	210	OFF
B5S	182	OFF
A5	148	OFF
5½ x 8½	139.7	OFF
B6	128	OFF

\*1 No discrimination is made between 8½ x 14 and 8½ x 11S. When the size is 8½ x 14, this is detected as 8½ x 11S.

#### B. Detection timing

##### (1) Platen mode (while in DF closed)

When the APS timing sensor (PS31) turns on while in DF closed, the original size is detected.

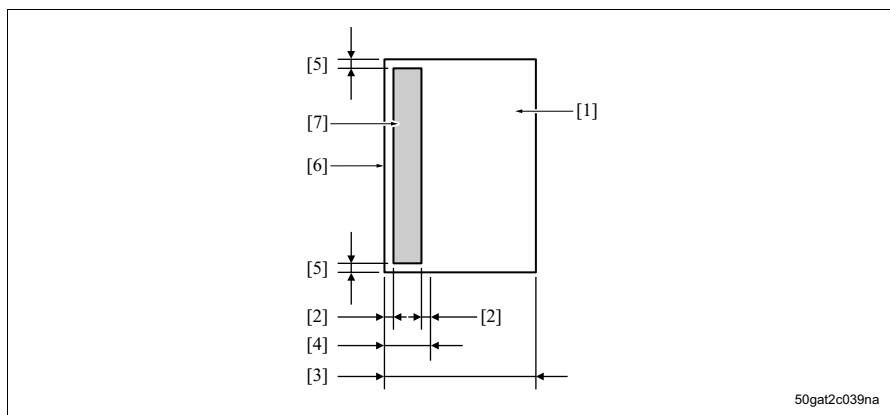
##### (2) Platen mode (while in DF open)

When the start key is pressed, the original size is detected.

### 6.3.3 AE control

When AE is selected, the density level of the original is detected to adjust it to an appropriate density automatically. The sampling range of the original density in the AE control varies for the platen mode and the DF mode.

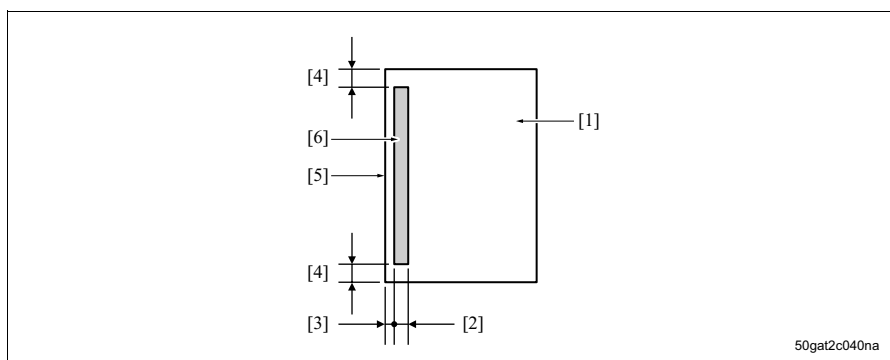
#### (1) AE sampling range in the platen mode



- [1] Original
- [2] L/100 mm
- [3] L mm
- [4] 30 mm

- [5] 10 mm
- [6] Leading edge of the original
- [7] AE sampling range

#### (2) AE sampling range in the DF mode



- [1] Original
- [2] 2.9 mm
- [3] 1.5 mm

- [4] 20 mm
- [5] Leading edge of the original
- [6] AE sampling range

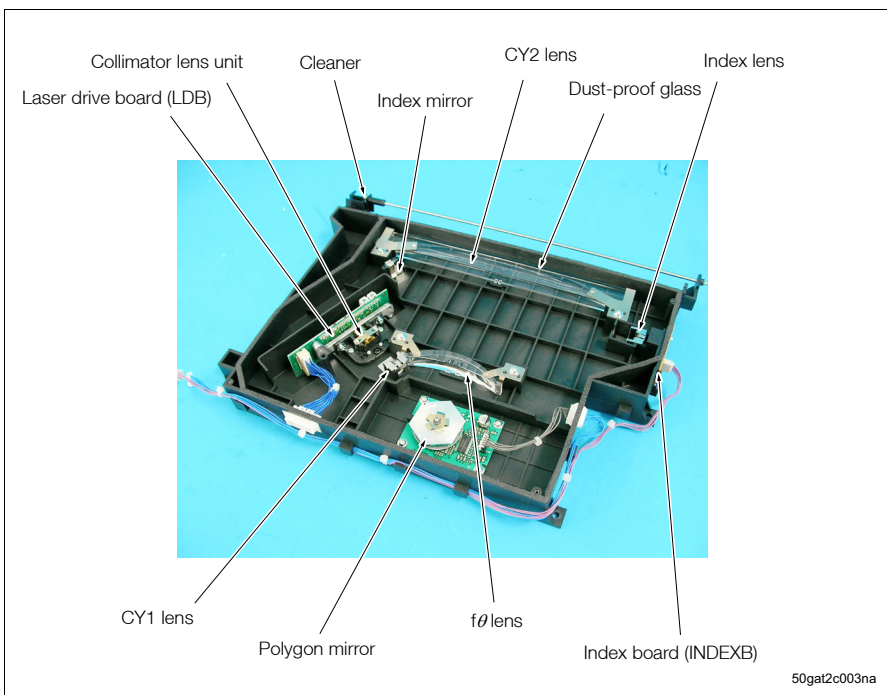
#### 6.3.4 Image processing

The following items are provided for the image processing. For details, See ["22. IMAGE PROCESSING"](#).

- AOC (Auto offset control)
- AGC (Auto gain control)
- Shading correction
- AE processing
- Range discrimination
- Brightness/density conversion
- Filter/magnification
- Density gamma (conversion)
- Halftone processing (error diffusion)
- Compression
- Storage of image data

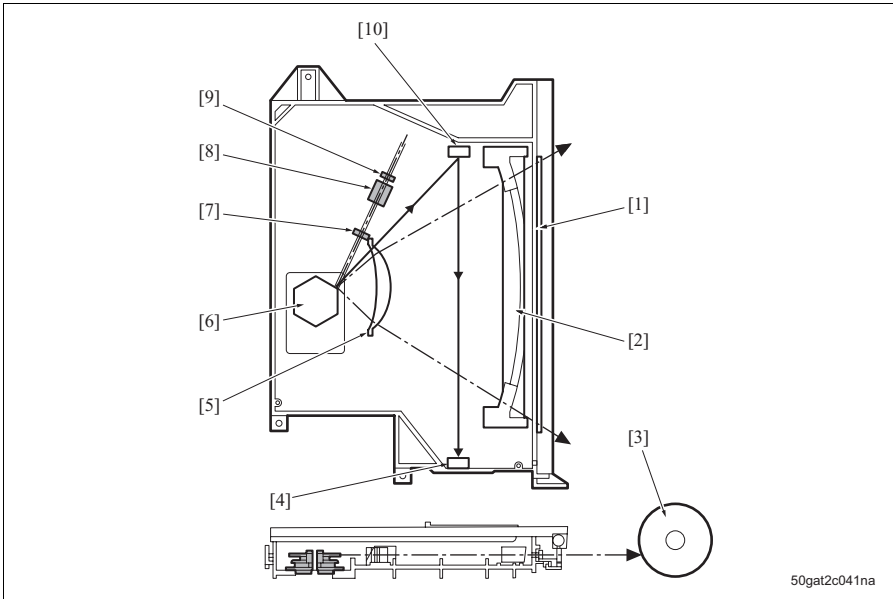
## 7. WRITE SECTION

### 7.1 Composition



## 7.2 Operation

### 7.2.1 Laser beam path



- |                          |                     |
|--------------------------|---------------------|
| [1] Dust-proof glass     | [6] Polygon mirror  |
| [2] CY2 lens             | [7] CY1 lens        |
| [3] Drum                 | [8] Collimator lens |
| [4] Index board (INDEXB) | [9] Laser diode     |
| [5] $f\theta$ lens       | [10] Index mirror   |

#### 7.2.2 Write control

Image data that has been processed is converted into laser beam on the laser drive board (LDB) to be irradiated on the drum. 1 laser diode emits 2 beams and 2 lines are written per 1 scan.

To prevent the mis-centering of a written image, an INDEX signal detected by the index board (INDEXB) is used to decide the reference position for writing in the drum shaft direction (main scan direction) to control the starting position of the laser irradiation onto the drum.

#### 7.2.3 Image stabilization control

The following items are provided for the image stabilization control. For details, See ["21. IMAGE STABILIZATION CONTROL"](#).

- MPC (Maximum power control)
- APC (Auto power control)
- Dot diameter adjustment control



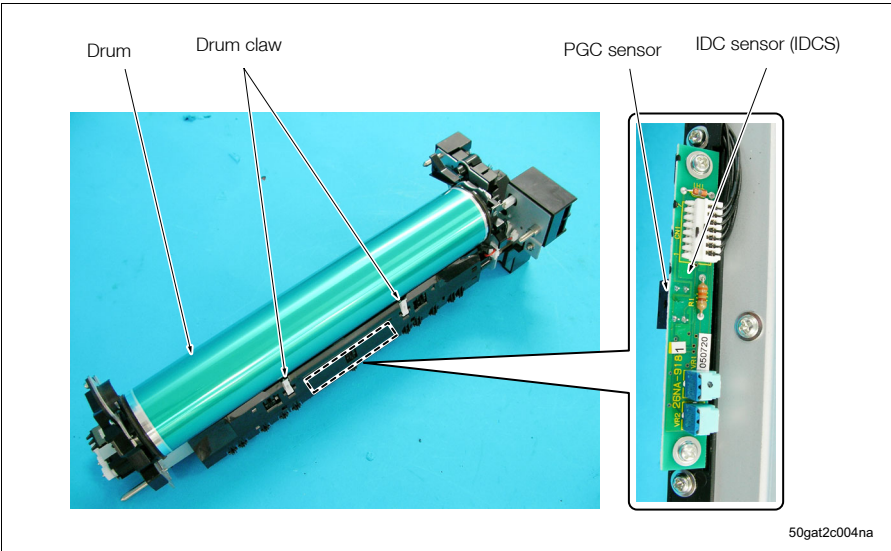
#### 7.2.4 Image processing

The following items are provided for the image processing. For details, See ["22.2 Image processing in the write section"](#).

- Rotation/elongation
- PWM
- Frequency conversion

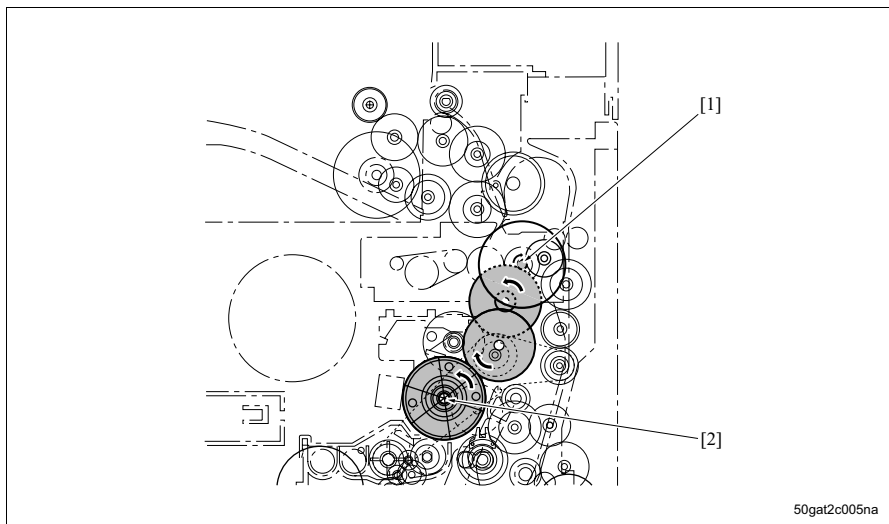
8. PHOTO CONDUCTOR SECTION

8.1 Composition



## 8.2 Drive

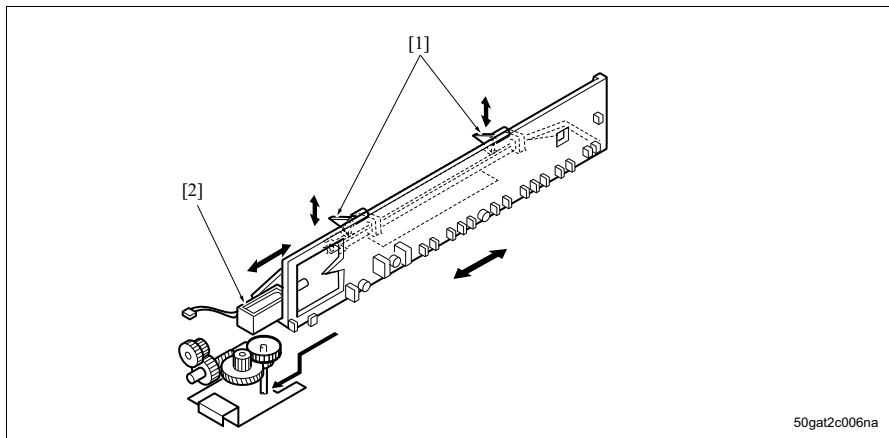
### 8.2.1 Drum drive



[1] Drum motor (M1)

[2] Drum drive shaft

### 8.2.2 Drum claw drive



[1] Drum claw

[2] Drum claw solenoid (SD2)

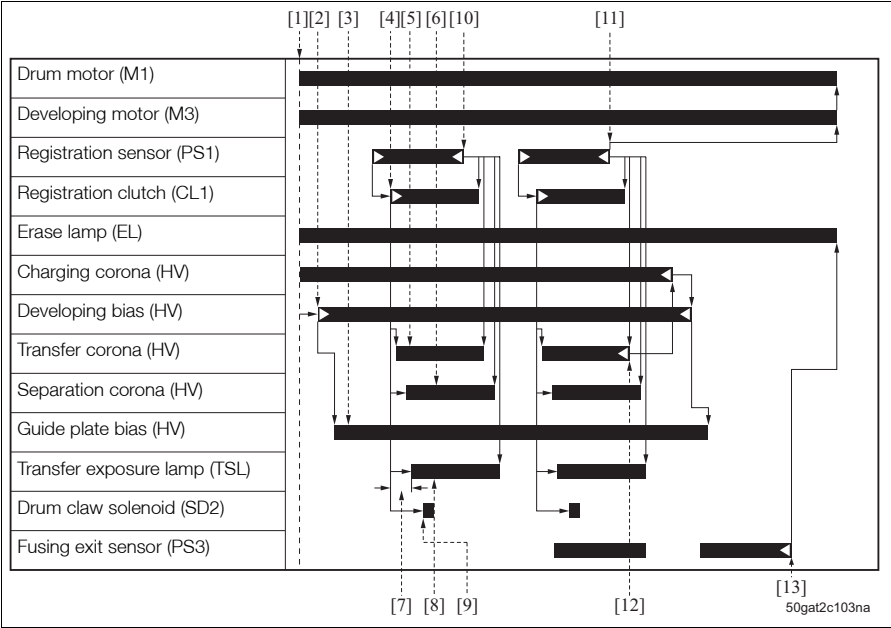
8.3 Operation

8.3.1 Image creation control

When the print start signal turns ON [1], various motors turn ON to place each unit in the operating condition. At the same time, the erase lamp (EL) turns ON to neutralize the drum and the charging corona charges the drum. A specified period of time after the print start signal turns ON, the developing bias turns ON [2] and then a high voltage is impressed [3] on the guide plate. When the preparation for image creation is made, an image is created on the drum surface by laser irradiation and developing.

A specified period of time after the registration clutch (CL1) turns ON [4], a high voltage is impressed on the transfer corona [5] and the separation corona [6] to turn ON the transfer exposure lamp (TSL) [8] and the drum claw solenoid (SD2) [9] sequentially. The ON timing [7] of TSL varies according to the type of paper. And the ON time period of TSL also varies according to the setting environment. An image created on the drum is transferred onto paper and then the paper is separated from the drum.

A specified period of time after the registration sensor (PS1) detects the trailing edge of paper and turns OFF [10], each operation turns OFF. However, some operations turn OFF a specified period of time after PS1 detects the trailing edge of the last paper and turns OFF [11], or a specified period of time after the fusing exit sensor (PS3) detects the trailing edge of the last paper and turns OFF [13]. For the charging corona, the developing bias and the guide plate bias, with the OFF timing [12] by the last paper of the transfer corona used as a starting point, each of the OFF timing is interlocked.



- |  |   |
|--|---|
| [1] Print start signal ON                    | [8] Transfer exposure lamp (TSL) ON (This varies according to the setting environment.) |
| [2] Developing bias high voltage impressed   | [9] Drum claw solenoid (SD2) ON   |
| [3] Guide plate bias high voltage impressed  | [10] Trailing edge of the 1st paper detected  |
| [4] Registration clutch (CL1) ON             | [11] Trailing edge of the last paper detected   |
| [5] Transfer corona high voltage impressed   | [12] Transfer of the last paper OFF   |
| [6] Separation corona high voltage impressed | [13] Trailing edge of the last paper detected   |
| [7] Varies according to the type of paper.   |   |

8.3.2 Drum claw control

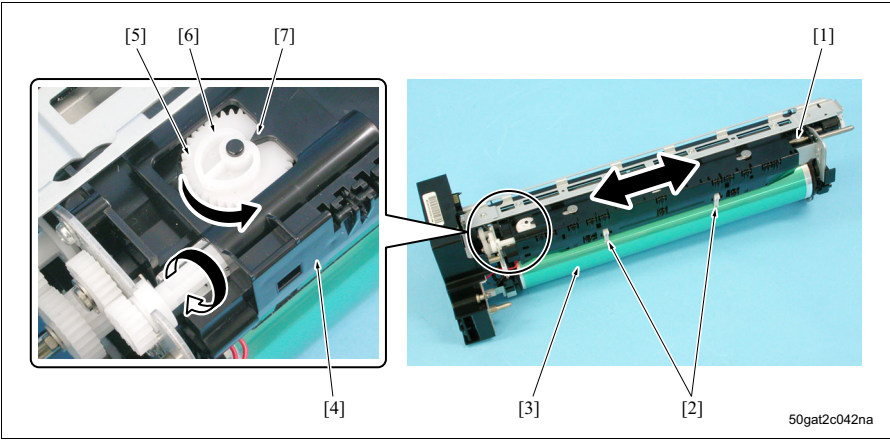
A. Purpose

Two drum claws are employed to prevent paper from winding up around the drum (winding-up jam). The contact and severance of the drum claws to and from the drum are made by the ON/OFF of the drum claw solenoid (SD2).

B. Swing operation

To prevent paper from getting stained at specific points and the drum [3] from being damaged, the drum claw [2] makes a swing operation of about 7 mm against the drum surface.

The drum claw unit [4] is provided with a projection [7]. This projection is pressed by the cam [6] provided on the gear [5] to push out the drum claw unit backward. When the gear rotates to release the cam, the drum claw unit is sent back to the original position by the spring [1]. This operation is repeated to swing the drum claw.



- |                      |                  |
|----------------------|------------------|
| △ [1] Spring         | △ [5] Gear       |
| △ [2] Drum claw      | △ [6] Cam        |
| △ [3] Drum           | △ [7] Projection |
| △ [4] Drum claw unit |                  |

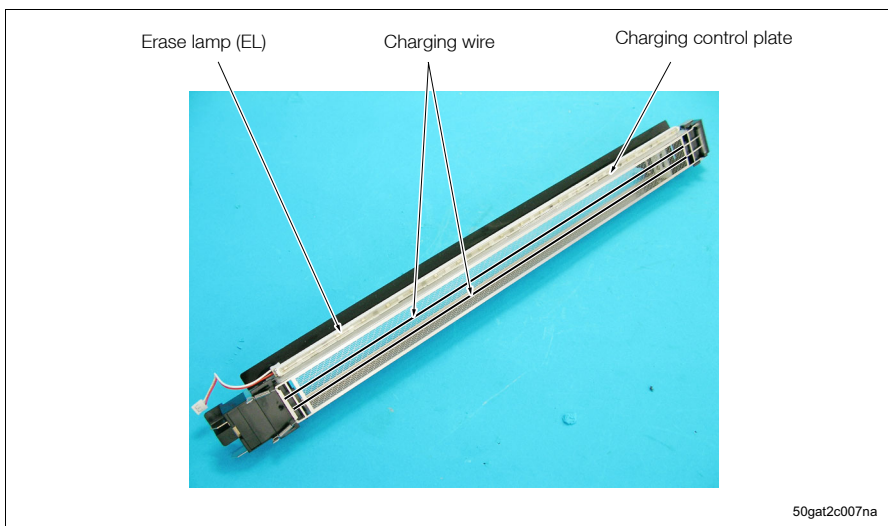
8.3.3 Image stabilization control

The following items are provided for the image stabilization control. For details, See "21. IMAGE STABILIZATION CONTROL".

- Drum rotation control
- Dot diameter adjustment control

## 9. CHARGING SECTION

### 9.1 Composition



### 9.2 Operation

#### 9.2.1 Charging control

##### A. Charging wire

The high voltage unit (HV) pressurizes 24V DC to impress a minus (–) DC voltage on the charging wire for discharge.

Charging output range: –500 to –1100  $\mu$ A

##### B. Charging grid

To obtain a uniform charging wire discharge, a minus (–) high voltage is impressed from the high voltage unit (HV) to the charging grid.

Charging grid voltage output range: –450 to –1090 V

#### 9.2.2 Erase lamp (EL) control

##### A. Purpose

To neutralize a residual potential on the drum surface and to obtain a uniform potential on the drum surface, the erase lamp (EL) is irradiated on the drum before charging.

##### B. Execution timing

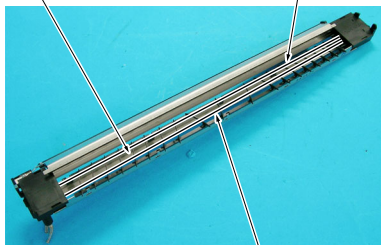
The erase lamp (EL) turns ON in synch with the print start signal turning ON. And it turns OFF a specified period of time after the fusing exit sensor (PS3) detects the trailing edge of the last paper.

## 10. TRANSFER/SEPARATION SECTION

### 10.1 Composition

Plunging prevention plate

Transfer wire



Separation wire



Transfer exposure lamp (TSL)

50gat2c008na

## 10.2 Operation

### 10.2.1 Transfer guide control

#### A. Purpose

To prevent the transfer guide plate from getting stained, a minus (–) DC voltage is impressed from the high voltage unit (HV).

Voltage impressed: –500 V

#### B. Execution timing

The impression of a voltage onto the transfer guide plate is made ON a specified period of time after the developing bias turns ON. And it turns OFF a specified period of time after the developing bias turns OFF.

### 10.2.2 Transfer/separation control

#### A. Transfer

The high voltage unit (HV) pressurizes a 24V DC to impress a plus (+) DC voltage on the transfer wire for discharging.

Transfer DC output range: 0 to –450  $\mu$ A

#### B. Separation

For separation, an AC high voltage and a minus (–) DC voltage are employed. The high voltage unit (HV) impresses a voltage onto the separation wire for discharging.

Separation AC output range: 300 to 1000  $\mu$ A

Separation DC output range: 0 to –200  $\mu$ A

### 10.2.3 Transfer exposure lamp (TSL) control

#### A. Purpose

The transfer exposure lamp (TSL) is turned ON to secure transferability and prevent a reverse charge to the drum.

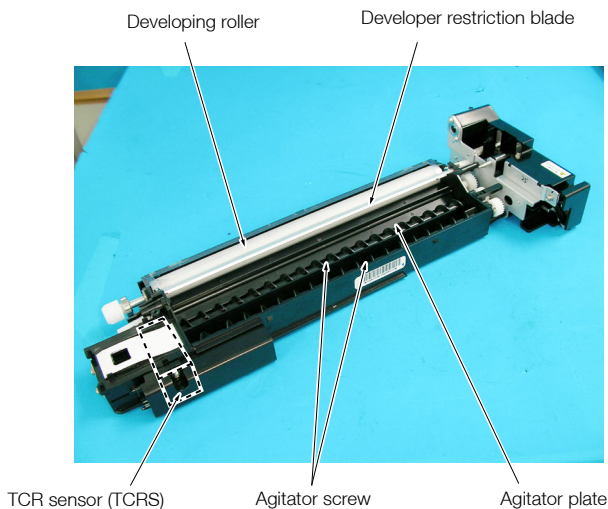
#### B. Execution timing

The transfer exposure lamp (TSL) turns ON a specified period of time after the registration clutch (CL1) turns ON. And it turns OFF a specified period of time after the registration sensor (PS1) turns OFF.

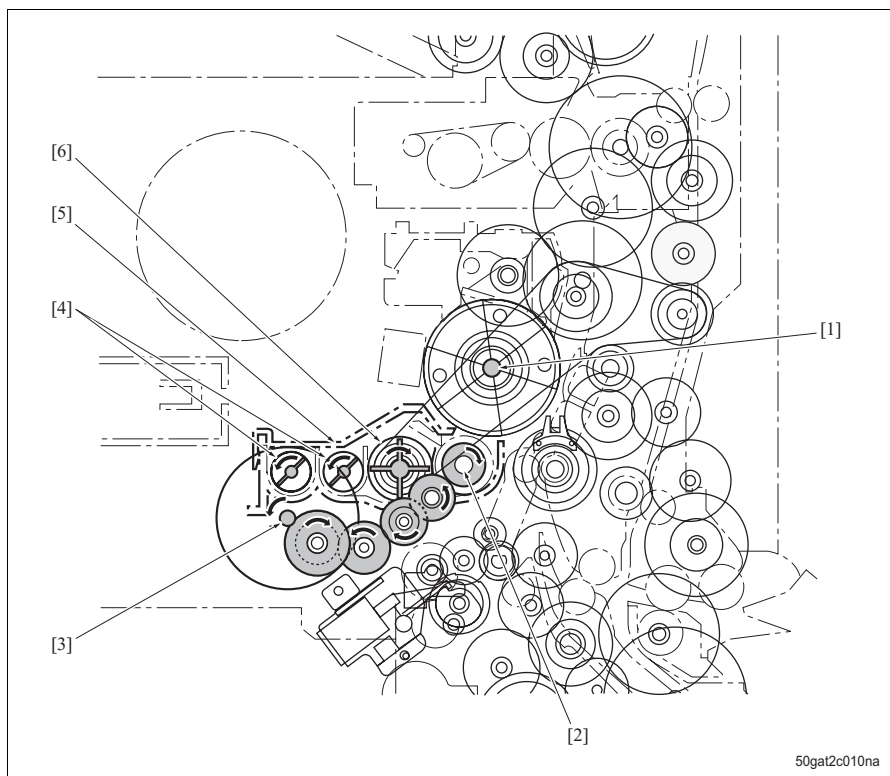


## 11.DEVELOPING UNIT

### 11.1 Composition



## 11.2 Drive

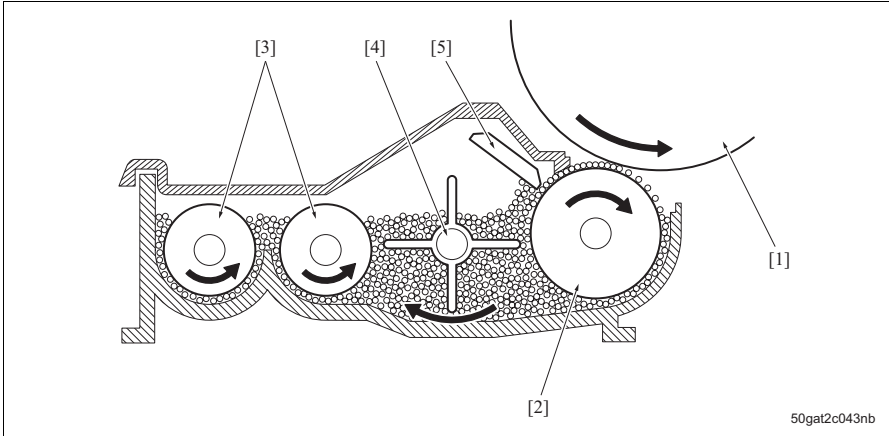


- |                           |                     |
|---------------------------|---------------------|
| [1] Drum                  | [4] Agitator screw  |
| [2] Developing roller     | [5] Developing unit |
| [3] Developing motor (M3) | [6] Agitator plate  |

## 11.3 Operation

### 11.3.1 Developer conveyance

Developer in the developing unit is supplied by the agitator plate [4] to the developing roller [2]. The thickness of developer attaching to the developing roller is restricted by the developer restriction blade [5]. After completion of transfer to the drum [1], developer remaining on the developing roller is sent back to the agitator screws [3]. The 2 agitator screws rotate in the same direction to obtain an improved conveyability when developer is changed.

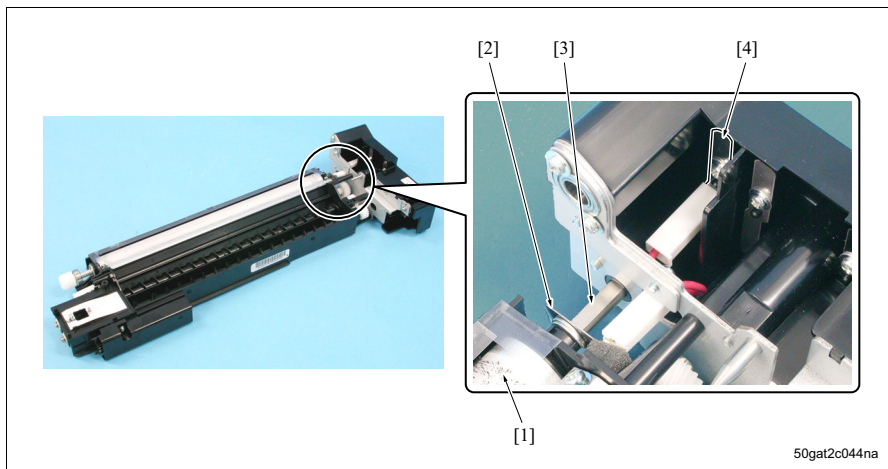


- |                       |                                 |
|-----------------------|---------------------------------|
| [1] Drum              | [4] Agitator plate              |
| [2] Developing roller | [5] Developer restriction blade |
| [3] Agitator screw    |                                 |

### 11.3.2 Developing bias

#### A. Purpose

To make toner get easily attached to the drum while in developing, a developing bias is impressed onto the developing roller [1].



[1] Developing roller

[2] Main pole position adjusting plate

[3] Developing bias shaft

[4] Developing bias contact

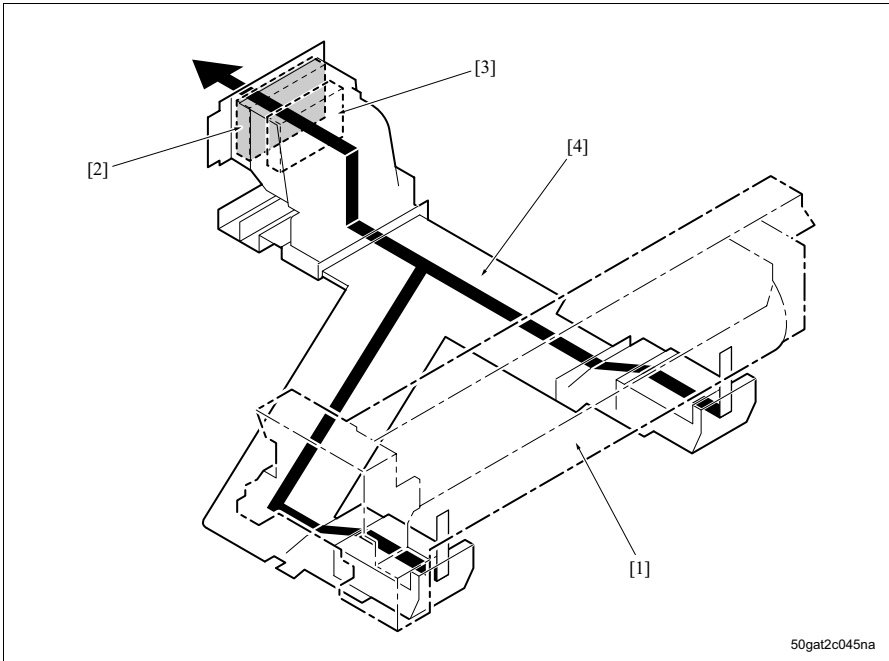
#### B. Timing

To prevent unnecessary carriers from attaching to the drum, a developing bias turns ON a specified period of time after the print start signal turns ON, and it turns OFF a specified period of time after charging turns OFF.

### 11.3.3 Developing suction control

#### A. Purpose

To prevent the splash of toner from the developing roller, the duct [4] is provided at 2 places of the developing unit [1]. Toner guided into the duct is sucked in by the developing suction fan (FM6) [3] to be collected by the suction filter /A [2].



[1] Developing unit

[2] Suction filter /A

[3] Developing suction fan (FM6)

[4] Duct

#### B. Developing suction fan (FM6) control

The developing suction fan (FM6) turns ON in synch with the developing motor (M3) turning ON. And it turns OFF a specified period of time after M3 turns OFF. However, while in the TCR adjustment mode, it turns OFF in synch with M3 turning OFF.

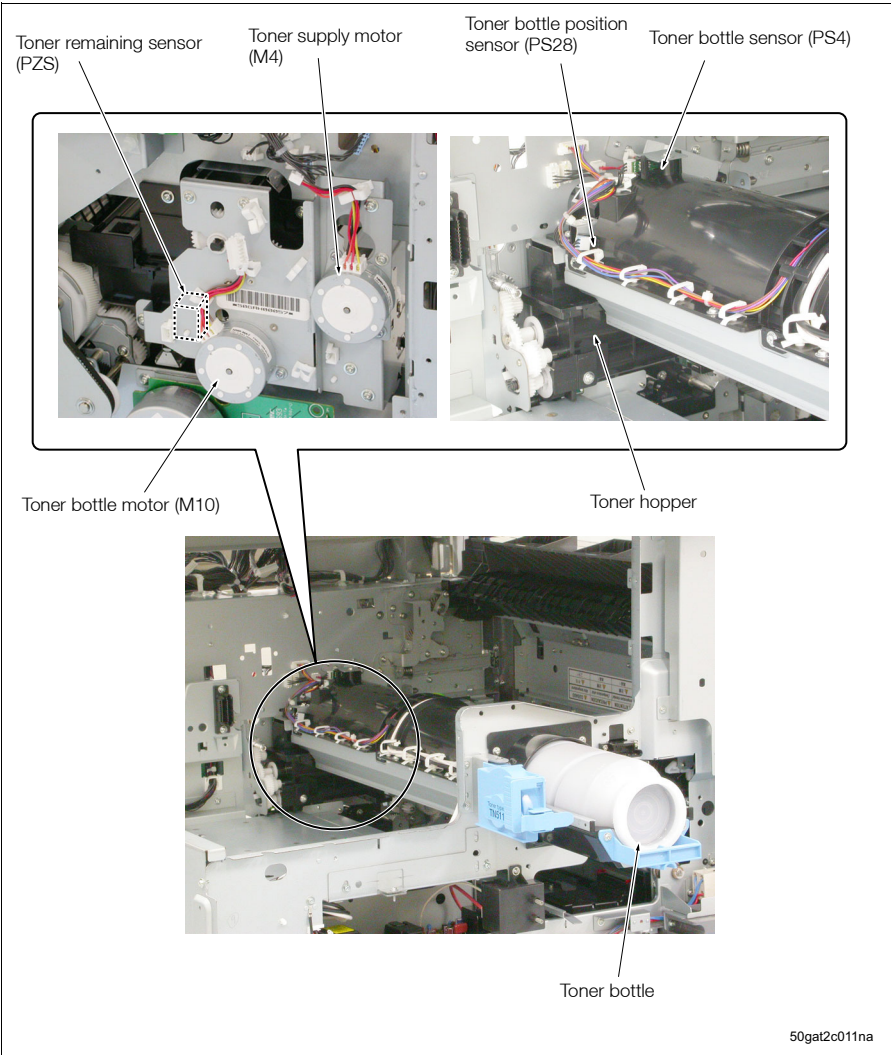
### 11.3.4 Image stabilization control

The following item is provided for the image stabilization control. For details, See ["21. IMAGE STABILIZATION CONTROL"](#).

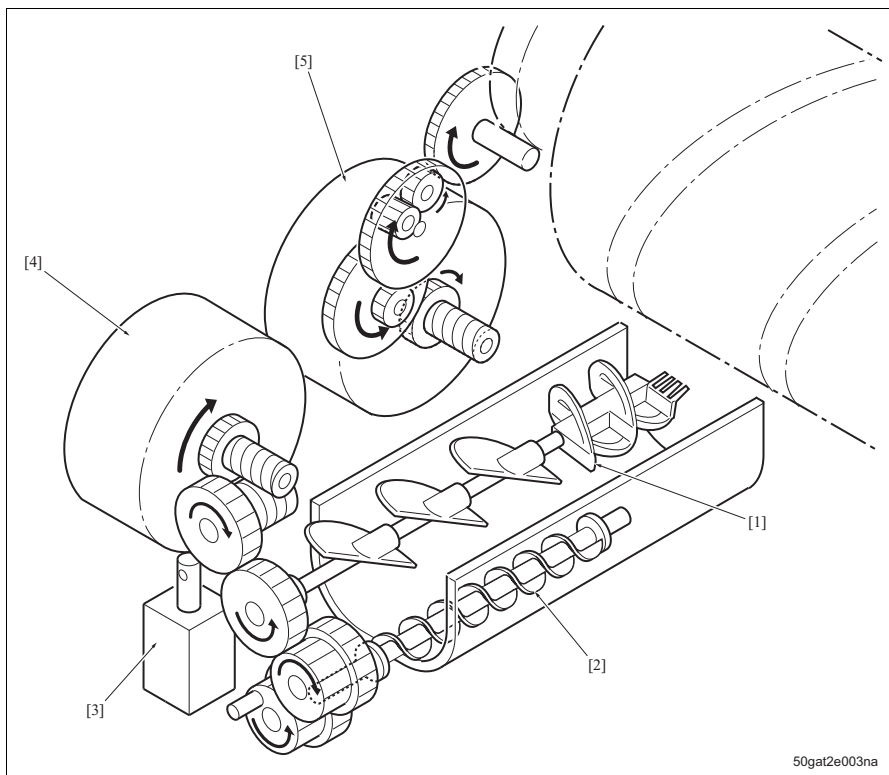
- Toner density control

# 12. TONER SUPPLY SECTION

## 12.1 Composition



## 12.2 Drive



- [1] Toner agitator plate
- [2] Toner conveyance screw
- [3] Toner solenoid (SD5)

- △ [4] Toner supply motor (M4)
- △ [5] Toner bottle motor (M10)

## 12.3 Operation

### 12.3.1 Toner level detection control

#### A. Toner level detection control



Toner remaining in the toner hopper is detected by the toner remaining sensor (PZS). When toner remaining in the hopper is found below the prescribed amount, a toner supply signal is issued to the printer control board (PRCB). This signal is transmitted to the operation section through the overall control board (OACB). Accordingly, OB displays a message in LCD on the LCD board (LCDB).

#### B. Detection timing

- At all times while in printing.

### 12.3.2 Toner supply control to the toner hopper

#### A. Operation

When the toner remaining sensor (PZS) detects the reduced level of remaining toner, the toner bottle motor (M10) turns ON and rotates the toner bottle to supply toner in the toner bottle to the toner hopper. When PZS detects the toner level being restored to its prescribed level, M10 turns OFF to get back to the stand-by condition.

#### B. Toner bottle position detection

The toner supply section is provided with the toner bottle position sensor (PS28) to detect the rotational position of the toner bottle whether it is at the home position.

### 12.3.3 Toner supply control to the developing unit

#### A. When the power switch (SW2) is turned ON

A specified period of time after SW2 turns ON, the TCR sensor (TCRS) detects the toner density in the developing unit. At this time, when a detected value is found below the initial density recorded in the CPU in the overall control board (OACB), the toner supply motor (M4) and the toner solenoid (SD5) turn ON to supply toner from the toner hopper to the developing unit.

#### B. While in printing

While in printing, the toner density is detected by the TCR sensor (TCRS). The ON time periods of the toner supply motor (M4) and the toner solenoid (SD5) are decided according to the output voltage of TCRS to supply toner from the toner hopper to the developing unit.

TCRS output voltage	Toner supply time period
Less than 2.01 V	0 second
2.01 to 2.14 V	0.10 seconds
2.14 to 2.22 V	0.15 seconds
2.22 to 2.28 V	0.20 seconds
2.28 to 2.32 V	0.25 seconds
2.32 to 2.39 V	0.40 seconds
2.39 V or more	0.50 seconds



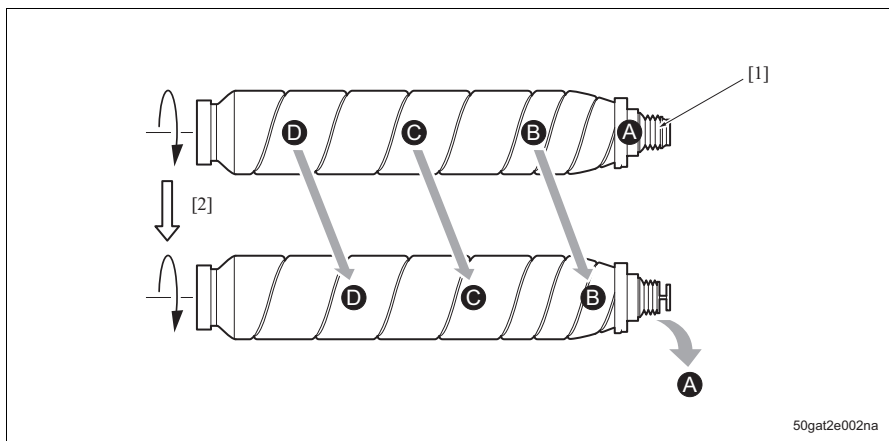
### 12.3.4 Toner conveyance control

#### A. Purpose

To convey toner in the toner bottle to the toner hopper.

#### B. Operation

The exit [1] of the toner bottle is normally closed. However, by setting the bottle to the toner supply section, the accordion section is pushed and compressed to let the exit open. A bottle set to the toner supply section rotates when the toner bottle motor (M10) turns ON. When the toner bottle rotates, toner is conveyed to the exit of the bottle along the spiral groove engraved on the surface of the toner bottle and flows out into the toner hopper.

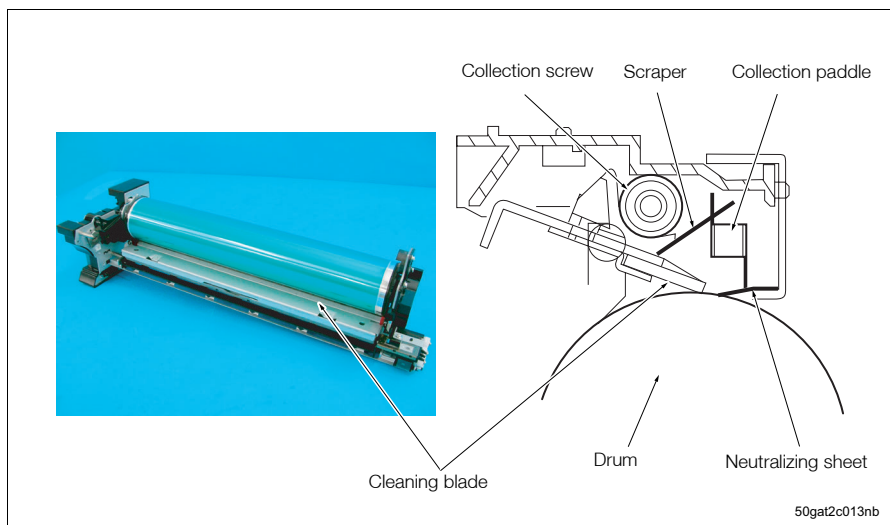


[1] Exit

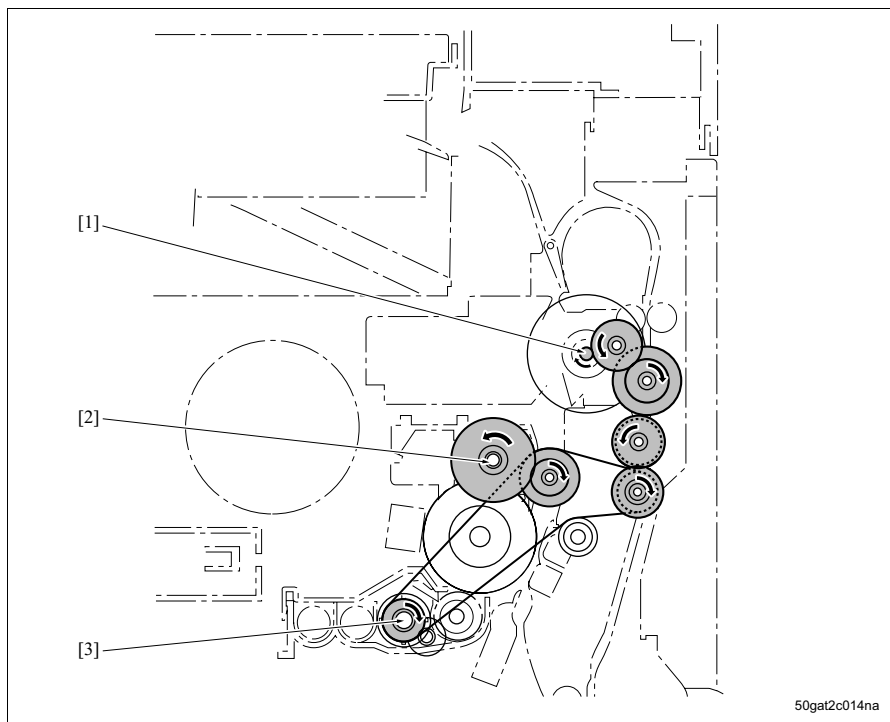
[2] Rotation

## 13. CLEANING/TONER RECYCLE SECTION

### 13.1 Composition



## 13.2 Drive



[1] Drum motor (M1)

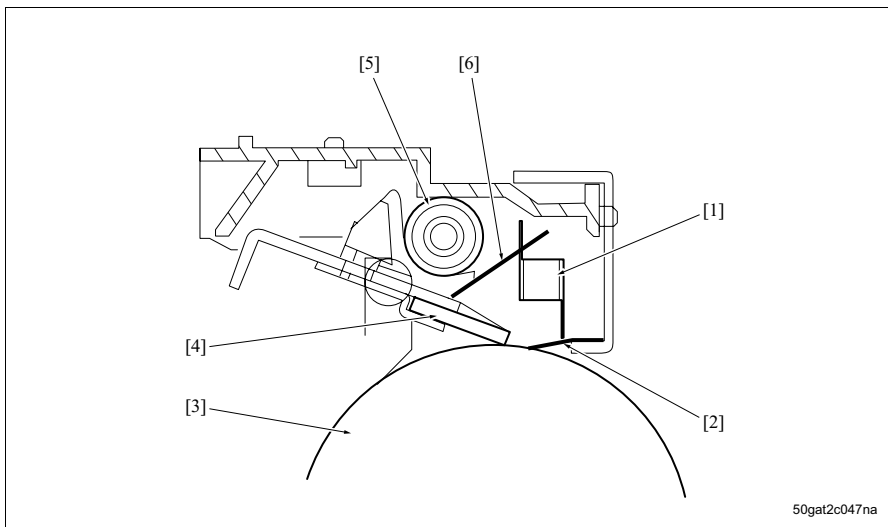
[3] Developer agitation drive

[2] Cleaning/recycle section drive

## 13.3 Operation

### 13.3.1 Cleaning operation

Toner scraped by the cleaning blade [4] is neutralized by the neutralizing sheet [2], then collected by the collection paddle [1], and finally guided to the collection screw [5]. At this time, toner remaining on the collection paddle is scraped by the scraper [6].



[1] Collection paddle

[2] Neutralizing sheet

[3] Drum

[4] Cleaning blade

[5] Collection screw

[6] Scraper

### 13.3.2 Toner collection mechanism

#### A. Purpose

To reuse toner scraped by the cleaning blade, the toner collection mechanism is provided.

#### B. Execution timing

The collection paddle to be used to collect toner is driven by the drum motor (M1) and the toner collection operation is made in synch with the ON/OFF of M1.

### 13.3.3 Toner conveyance operation

#### A. Toner conveyance mechanism

Toner collected is conveyed to the hopper in the toner supply section by the collection screw of the cleaning section.

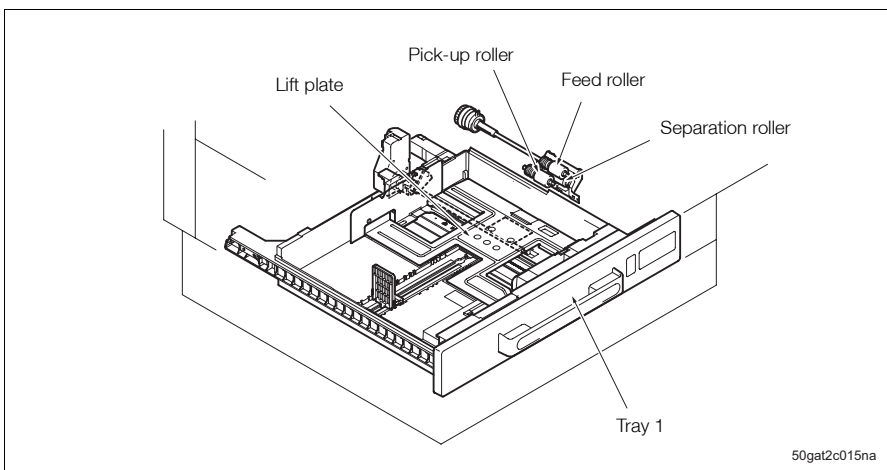
#### B. Execution timing

The collection screw is driven by the drum motor (M1) and the toner conveyance operation is made in synch with the ON/OFF of M1.

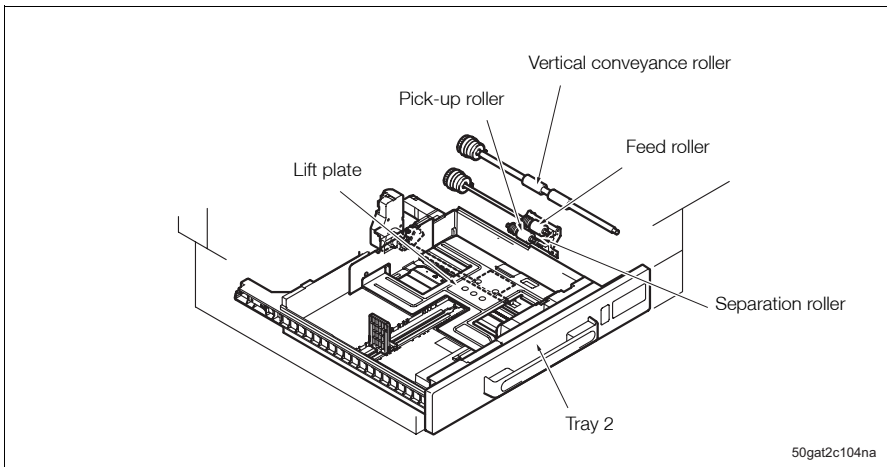
## 14. PAPER FEED SECTION (Tray 1/2)

### 14.1 Composition

#### 14.1.1 Tray 1

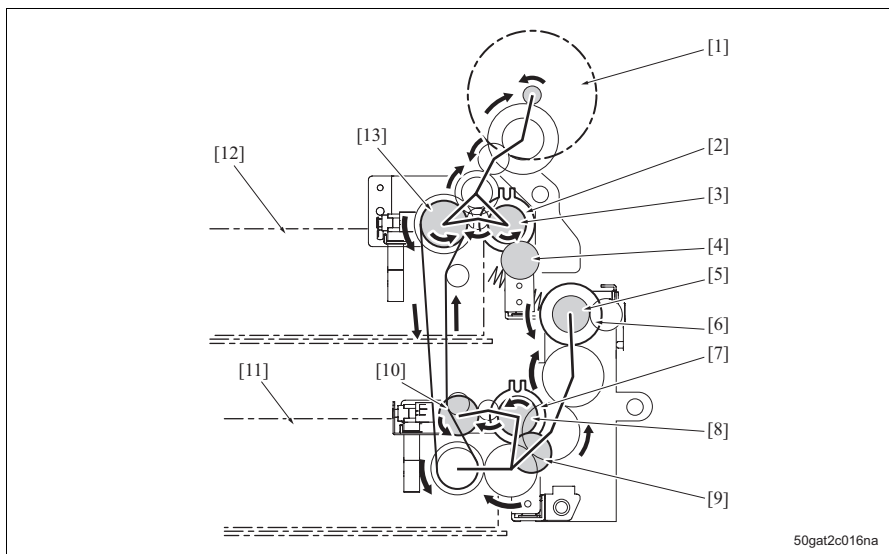


#### 14.1.2 Tray 2



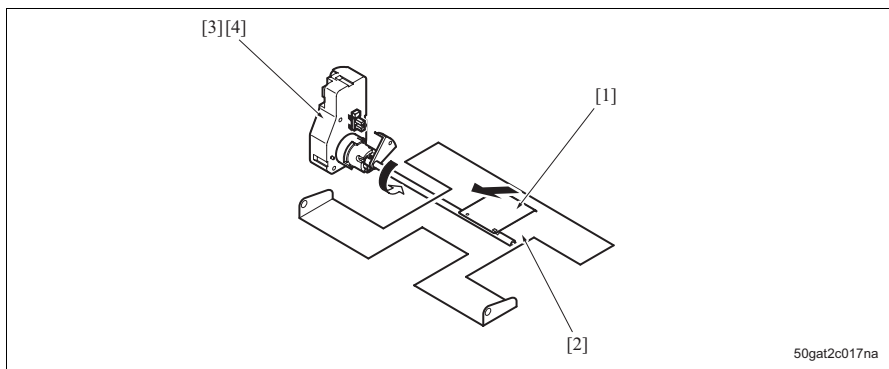
## 14.2 Drive

### 14.2.1 Paper feed drive



- |                                      |                          |
|--------------------------------------|--------------------------|
| [1] Feed motor (M9)                  | [8] Feed roller /2       |
| [2] Feed clutch /1 (CL4)             | [9] Separation roller /2 |
| [3] Feed roller /1                   | [10] Pick-up roller /2   |
| [4] Separation roller /1             | [11] Tray 2              |
| [5] Vertical conveyance roller       | [12] Tray 1              |
| [6] Vertical conveyance clutch (CL3) | [13] Pick-up roller /1   |
| [7] Feed clutch /2 (CL5)             |                          |

### 14.2.2 Tray lift drive



- |     |            |     |                          |
|-----|------------|-----|--------------------------|
| [1] | Lift arm   | [3] | Paper lift motor /1 (M7) |
| [2] | Lift plate | [4] | Paper lift motor /2 (M8) |

### 14.3 Operation

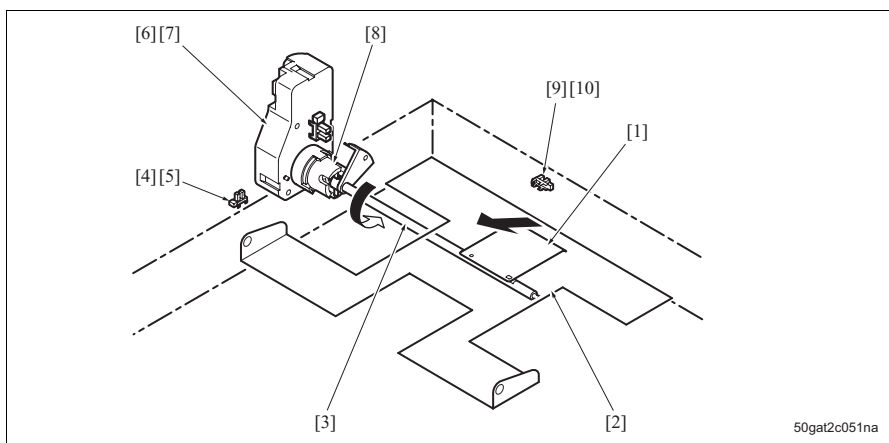
### 14.3.1 Up/down control

### A. Up drive operation

The lift drive shaft [3] is rotated by the paper lift motors /1 (M7) [6] and /2 (M8) [7]. The lift drive shaft is provided with the lift arm [1] and the lift plate [2] is pushed up when the lift drive shaft rotates. In this way, the up drive operation of the lift plate is conducted.

### B. Down drive operation

Pulling out the tray disengages the coupling [8] of the paper lift motors /1 (M7) and /2 (M8) from the lift drive shaft. In this way, the driving force of M7 or M8 that holds the lift plate at the upper position is released and the lift plate goes down by its own weight.



- |                               |                                   |
|-------------------------------|-----------------------------------|
| [1] Lift arm                  | [6] Paper lift motor /1 (M7)      |
| [2] Lift plate                | [7] Paper lift motor /2 (M8)      |
| [3] Lift drive shaft          | [8] Coupling                      |
| [4] Tray set sensor /1 (PS8)  | [9] Upper limit sensor /1 (PS6)   |
| [5] Tray set sensor /2 (PS14) | [10] Upper limit sensor /2 (PS13) |

### C. Operation timing

When the tray is set, the tray set sensors /1 (PS8) and /2 (PS14) turn ON. In this way, the paper lift motors /1 (M7) and /2 (M8) turn ON to raise the lift plate. When the lift plate goes up and the upper most paper that is loaded turns ON the upper limit sensors /1 (PS6) and /2 (PS13), M7 and M8 turn OFF to stop the up drive operation.

When the paper feed operation causes PS6 and PS13 to turn OFF from ON while in the print operation, M7 and M8 turn ON again to raise the lift plate. In this way, when PS6 and PS13 turn ON again, M7 and M8 turn OFF to stop the up drive operation.

**14.3.2 Paper size detection control**

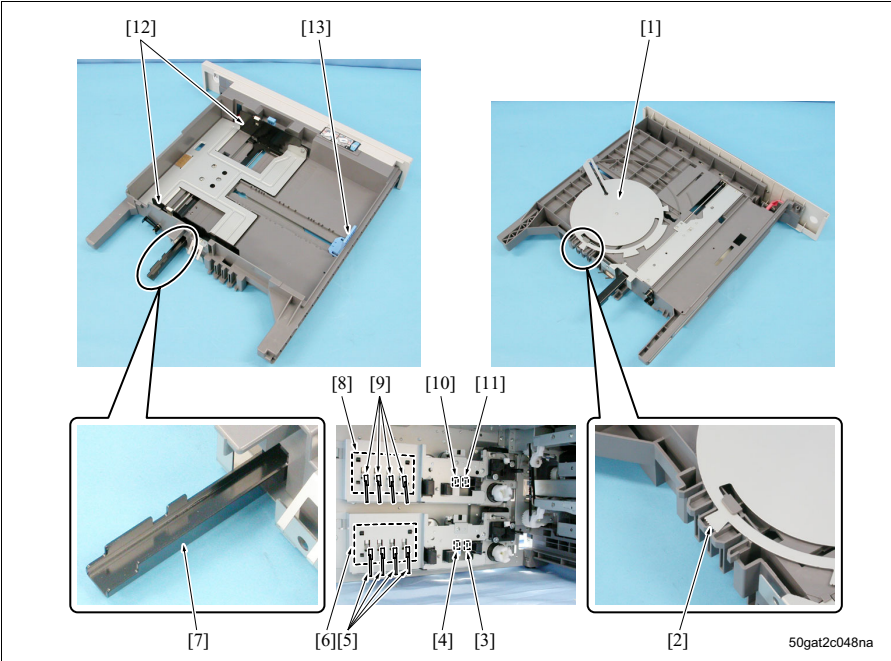
**A. Paper size detection mechanism**

**(1) Size detection in the main scan direction**

The side guide plate [12] is provided with the size detection actuator [7]. And interlocked with the side guide plate, this actuator sticks out to the rear side of the tray. The size detection actuator is provided with the 2 lines of notches, which are detected by the paper size sensors /Fr1 (PS11) [11] and /Rr1 (PS10) [10], or the paper size sensors /Fr2 (PS17) [3] and /Rr2 (PS16) [4] equipped individually on the rear of the main body. The notches of the size detection actuator vary for each paper size and the paper size is detected in the main scan direction by the combination of the ON/OFF of PS10 and PS11, or PS16 and 17.

**(2) Size detection in the sub scan direction**

The rear guide plate [13] is provided with the size detection actuator [1], which rotates in interlock with the rear guide plate. The size detection actuator is provided with a projection [2]. When this projection comes at the rear side of the tray, it pushes the detection levers [9] and [6] of the paper size boards /1 (PSB/1) [8] and /2 (PSB/2) [6] equipped on the back of the main body. 4 detection levers are equipped on each of the paper size board and they individually turn ON and OFF the paper size detection switches /1 (SW101) to /4 (SW104) provided on each board. On the other hand, the projections of the size detection actuator vary in their circumference and the intervals between each of these projections, and accordingly, either one of the 4 detection levers is to be pushed according to the position of the guide plate. In this way, the paper size in the sub scan direction is detected by the combination of the ON/OFF of SW101 to SW104.



- |                                   |                                    |
|-----------------------------------|------------------------------------|
| [1] Size detection actuator       | [8] Paper size board /1 (PSB/1)    |
| [2] Projection                    | [9] Detection lever                |
| [3] Paper size sensor /Fr2 (PS17) | [10] Paper size sensor /Rr1 (PS10) |
| [4] Paper size sensor /Rr2 (PS16) | [11] Paper size sensor /Fr1 (PS11) |
| [5] Detection lever               | [12] Side guide plate              |
| [6] Paper size board /2 (PSB/2)   | [13] Rear guide plate              |
| [7] Size detection actuator       |                                    |



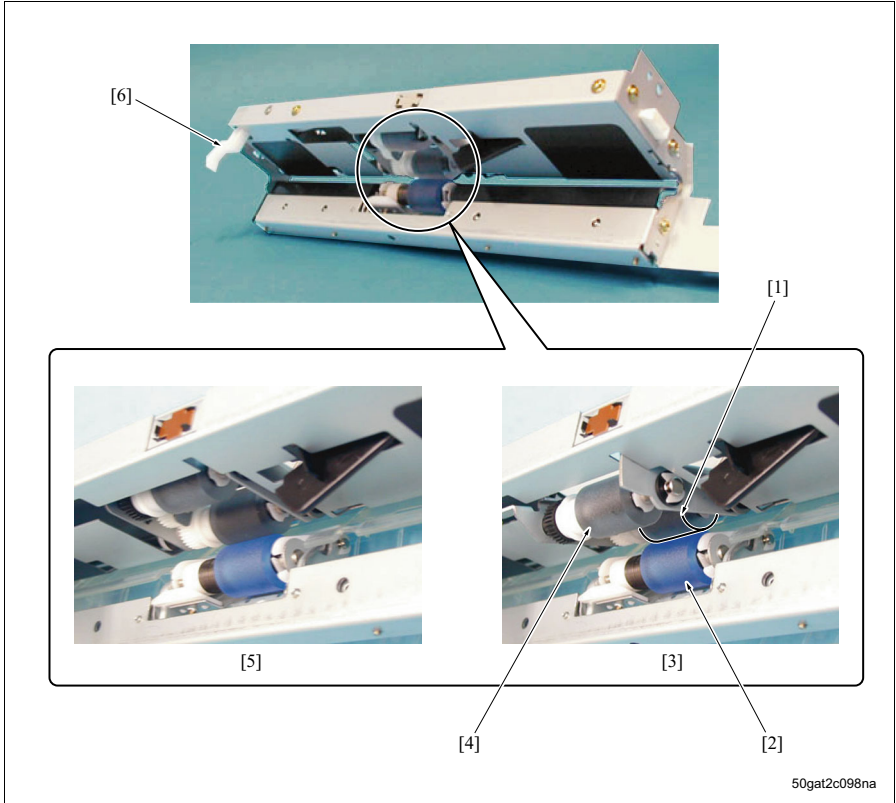
B. Paper size detection table

Paper size	Paper size boards /1 (PSB/1), /2 (PSB/2)				Paper size sensor /Rr1 (PS10), /Rr2 (PS16)	Paper size sensor /Fr1 (PS11), /Fr2 (PS17)
	SW101	SW102	SW103	SW104		
B5	ON	ON	OFF	OFF	ON	OFF
A5S	ON/OFF	OFF	OFF	OFF	OFF	OFF
A4	ON/OFF	OFF	OFF	OFF	ON	OFF
8½ x 11	OFF	OFF	OFF	OFF	OFF	OFF
8½ x 11S	ON	OFF	OFF	ON	OFF	ON
B5S	OFF	OFF	ON	OFF	OFF	OFF
A4S	OFF	ON/OFF	ON	ON	OFF	ON
8½ x 14	ON	ON	ON	OFF	ON	ON
B4	ON	ON	ON	OFF	ON	OFF
A3	ON	ON/OFF	ON	ON	ON	OFF

### 14.3.3 Paper feed control

#### A. Pick-up mechanism

The pick-up roller [4] is brought up and down mechanically by the lever [6] provided on the rear side of the paper feed unit. When the tray is set, the lever is pushed by the tray to bring down the pick-up roller. In this way, the pick-up roller comes in contact with paper to pick it up.

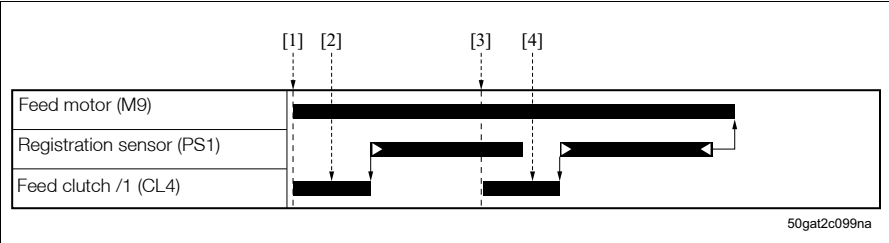


- |   |   |
|---|---|
| [1] Feed roller   | [4] Pick-up roller  |
| [2] Separation roller   | [5] When the tray is not set (with the pick-up roller brought up) |
| [3] When the tray is set (with the pick-up roller brought down) | [6] Lever   |

**B. Pick-up control**

**(1) Tray 1 pick-up control**

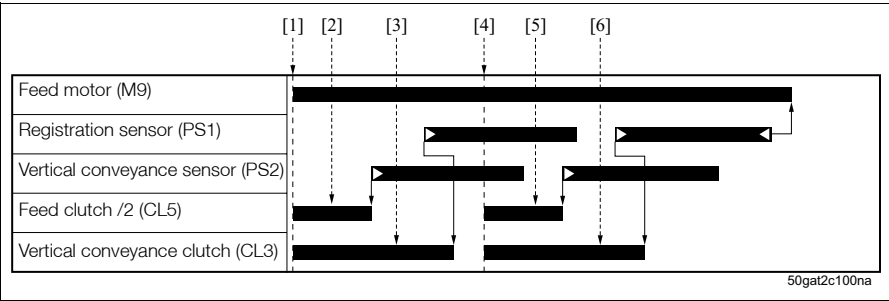
When the print start signal turn ON [1], the feed motor (M9) and the feed clutch /1 (CL4) also turn ON. In this way, the driving force of M9 is transmitted to the pick-up roller and the feed roller to pick up [2] the 1st sheet of paper. When paper is conveyed and the registration sensor (PS1) turns ON, CL4 turns OFF to complete the pick-up operation. The pick-up [4] operation of the 2nd and succeeding sheets of paper is conducted using the paper feed request signal [3] as a starting point.



- |                              |                               |
|------------------------------|-------------------------------|
| [1] Print start signal ON    | [3] Paper feed request signal |
| [2] Pick-up of the 1st paper | [4] Pick-up of the 2nd paper  |

**(2) Tray 2 pick-up control**

When the print start signal turns ON [1], M9, the feed clutch /2 (CL5), and the vertical conveyance clutch (CL3) turn ON. In this way, the driving force of M9 is transmitted to the pick-up roller, the feed roller and the vertical conveyance roller to conduct the pick-up [2] and the vertical conveyance [3] of the 1st sheet of paper. When paper is conveyed and the vertical conveyance sensor (PS2) turns ON, CL5 turns OFF to complete the pick-up operation. However, since CL3 keeps turning ON, paper is conveyed to the registration section by the vertical conveyance roller. In this manner, when PS1 turns ON, CL3 turns OFF a specified period of time after that. The pick-up [5] and the vertical conveyance [6] of the 2nd and succeeding sheets of paper are conducted using the paper feed request signal [4] as a starting point.

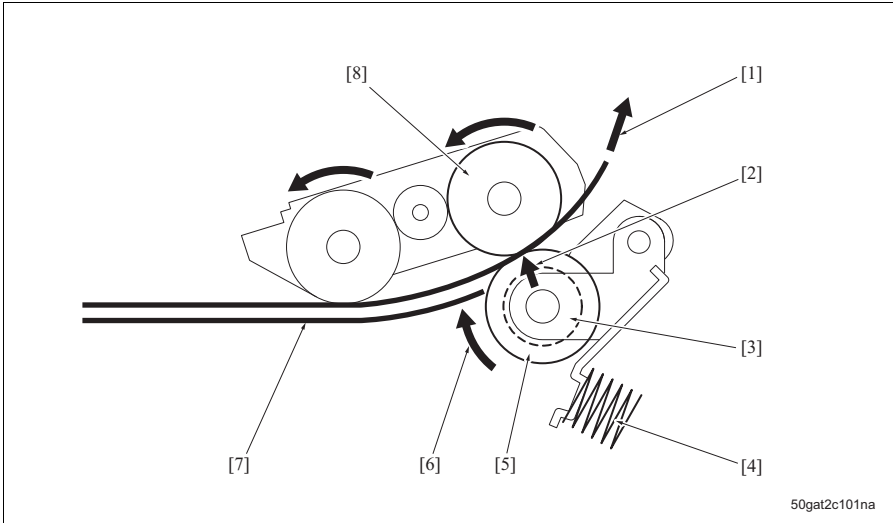


- |  |  |
|--|--|
| [1] Print start signal ON                | [4] Paper feed request signal            |
| [2] Pick-up of the 1st paper             | [5] Pick-up of the 2nd paper             |
| [3] Vertical conveyance of the 1st paper | [6] Vertical conveyance of the 2nd paper |

### C. Separation mechanism

The separation roller [5] is pressed against the feed roller [8] by the operating pressure generated by the pressure [2] of the spring [4] and the torque of the torque limiter [3]. This operating pressure of the feed roller, separation roller and torque limiter becomes a limit torque to prevent the double feed of paper.

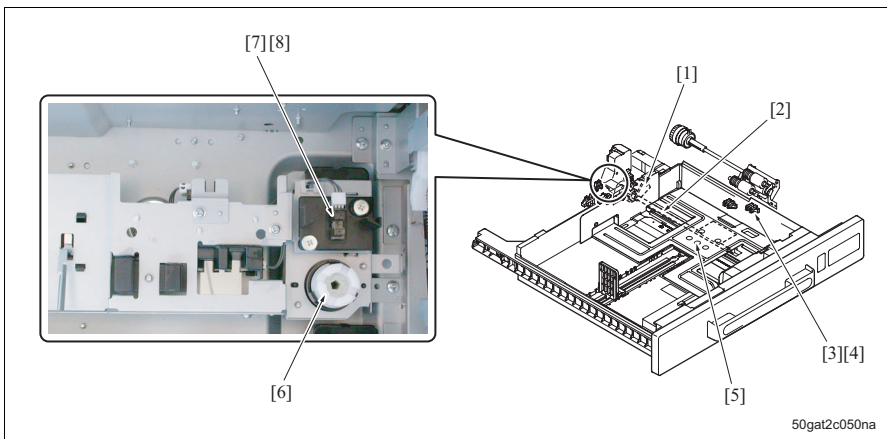
When there is no paper between the separation roller and the feed roller, or when only one sheet of paper is conveyed, the operating pressure of the feed roller, the paper and the spring is in excess of the limit torque, and therefore, the separation roller rotates [6] following the rotation of the feed roller. When two or more sheets of paper are conveyed between the separation roller and the feed roller, the limit torque is greater than the frictional force between 2 sheets of paper, and accordingly, the separation roller stops and the lower side paper [7] in contact with the separation roller is not conveyed.



- |                                |                        |
|--------------------------------|------------------------|
| [1] Paper conveyance direction | [5] Separation roller  |
| [2] Pressing                   | [6] Driven rotation    |
| [3] Torque limiter             | [7] 2nd sheet of paper |
| [4] Spring                     | [8] Feed roller        |

#### 14.3.4 Paper empty control

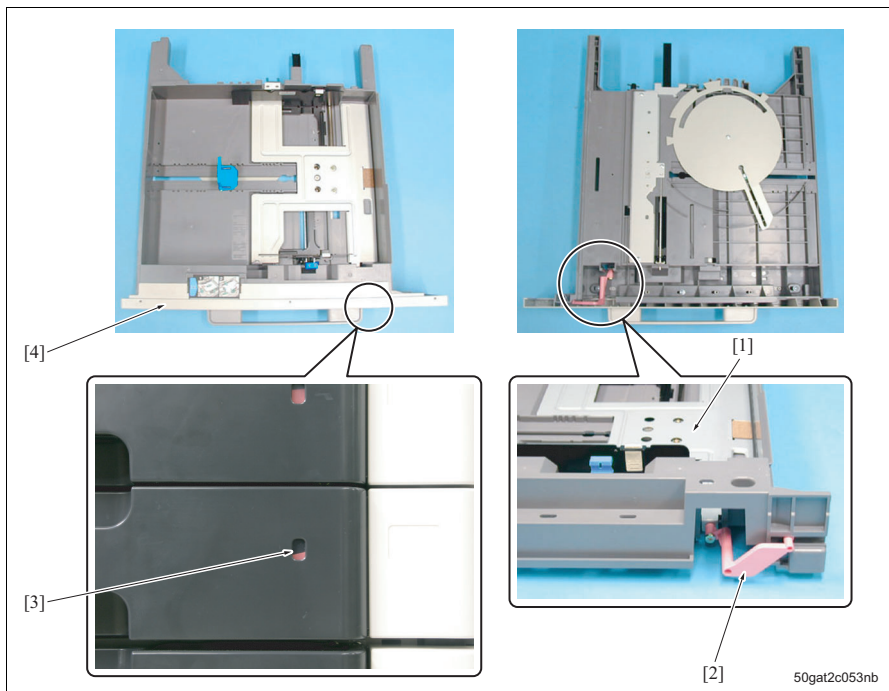
The paper empty of the tray is detected by the paper empty sensors /1 (PS5) [3] and /2 (PS12) [4]. And to prompt the supply of paper before paper in the tray runs out completely, the paper near-empty sensors /1 (PS9) [7] and /2 (PS15) [8] are equipped. The lift drive shaft [2] that brings up the lift plate [5] is provided with the actuator [1] and PS9 and PS15 are turned ON and OFF by this actuator. When a sufficient amount of paper is loaded on the tray, the actuator turns ON PS9 and PS15. However, when the amount of paper gets reduced and the lift plate goes up, the actuator turns OFF PS9 and PS15. In this way, it is detected that the paper loaded in the tray comes near to an end.



- |                                  |                                 |
|----------------------------------|---------------------------------|
| [1] Actuator                     | [5] Lift plate                  |
| [2] Lift drive shaft             | [6] Coupling                    |
| [3] Paper empty sensor /1 (PS5)  | [7] Near-empty sensor /1 (PS9)  |
| [4] Paper empty sensor /2 (PS12) | [8] Near-empty sensor /2 (PS15) |

### 14.3.5 Paper remaining detection mechanism

The front cover [4] of the tray is provided with the paper remaining display window [3], and the paper remaining in the tray can be checked through this window. The inside of the paper remaining display window is provided with the display lever [2] which is interlocked with the up/down position of the lift plate [1]. The display lever is red in color and it is indicated that the more the red portion that can be seen through the paper remaining display window, the less paper there remains in the tray.



[1] Lift plate

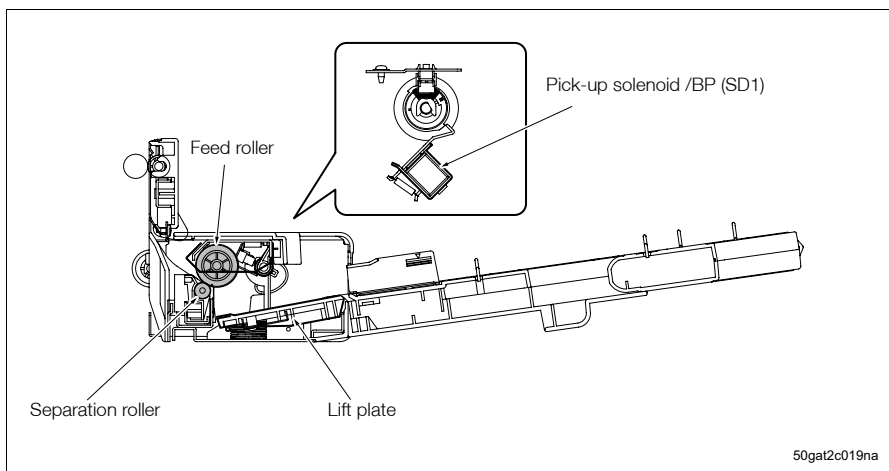
[2] Display lever

[3] Paper remaining display window

[4] Front cover

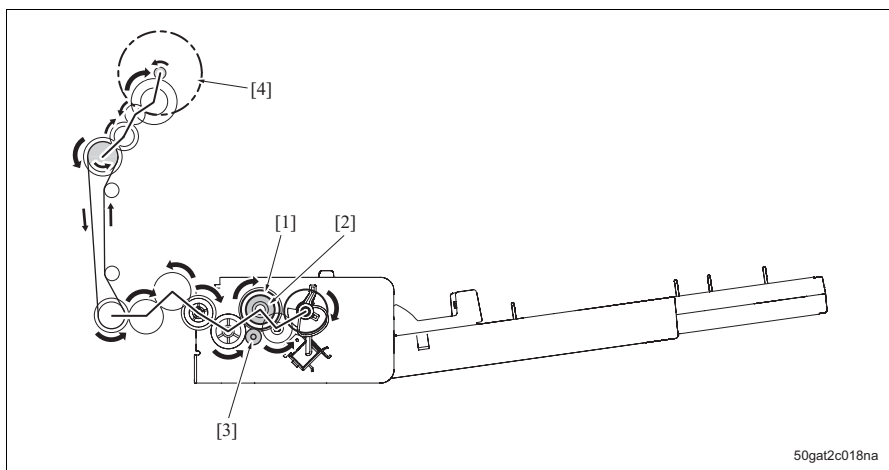
## 15. BYPASS SECTION

### 15.1 Composition



## 15.2 Drive

### 15.2.1 Paper feed drive



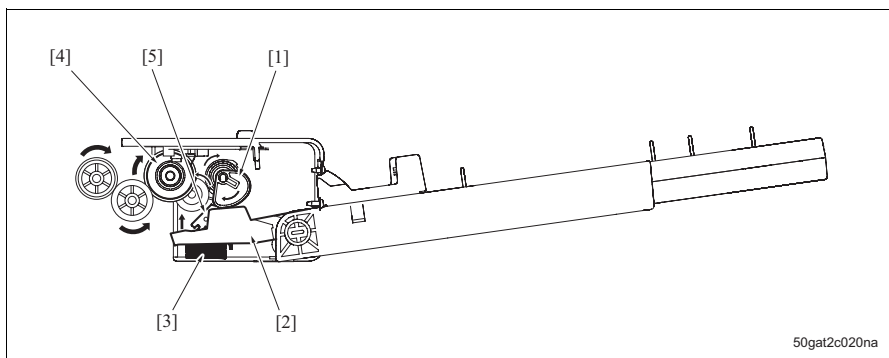
[1] Feed clutch /BP (CL6)

[2] Feed roller

[3] Separation roller

[4] Feed motor (M9)

### 15.2.2 Tray lift drive



[1] Cam

[2] Lift plate

[3] Spring

[4] Feed clutch /BP (CL6)

[5] Pick-up solenoid /BP (SD1)

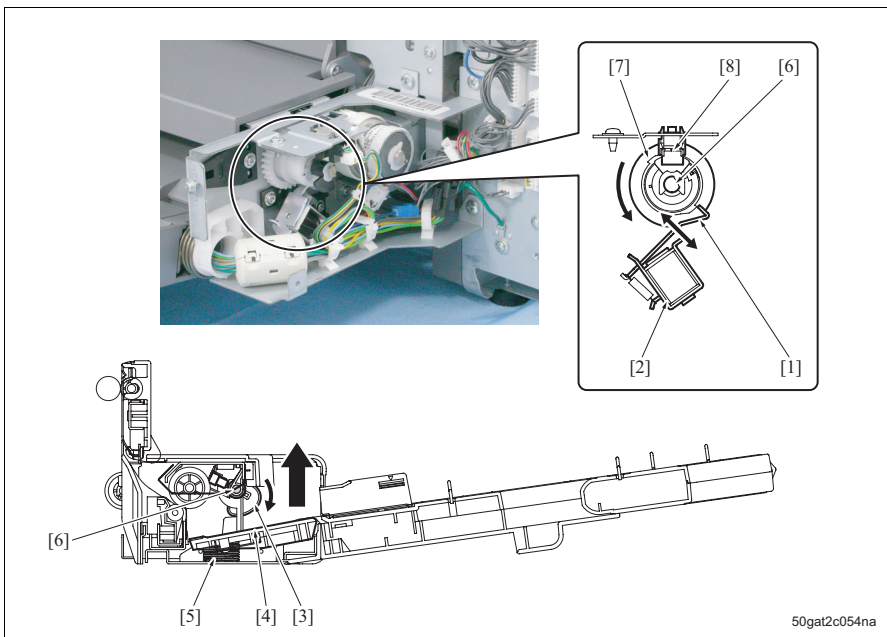


## 15.3 Operation

### 15.3.1 Up/down control

#### A. Up drive operation

The lift plate [4] is of the construction in which it is pushed up by the spring [5] provided on the lower section. However, while in the stand-by condition, it is hold down by the cam [3] provided on the lift drive shaft [6]. And the ON/OFF of the gear [7] of the lift drive shaft is controlled by the stopper [1] that is driven by the pick-up solenoid /BP (SD1) [2]. When the feed motor (M9) is turned ON by a print start signal, SD1 turns ON a specified period of time after that. In this way, the stopper is released and the driving force of M9 is transmitted to the lift drive shaft. When the cam that holds down the lift plate is released by the rotation of the lift drive shaft, the lift plate is brought up by the force of the spring. When the lift sensor (PS23) [8] is turned ON by the rotation of the lift drive shaft, SD1 turns OFF to stop the up drive of the lift plate. This up drive operation causes paper loaded in the tray to come in contact with the feed roller to allow paper to be fed.



- |                                |                        |
|--------------------------------|------------------------|
| [1] Stopper                    | [5] Spring             |
| [2] Pick-up solenoid /BP (SD1) | [6] Lift drive shaft   |
| [3] Cam                        | [7] Gear               |
| [4] Lift plate                 | [8] Lift sensor (PS23) |

#### B. Down drive operation

When the vertical conveyance sensor (PS2) detects the leading edge of paper and turns ON, the pick-up solenoid /BP (SD1) turns ON a specified period of time after that and turns OFF a specified period of time after the lift sensor (PS23) turns OFF. In this way, the cam of the lift drive shaft presses down the lift tray to be placed in the stand-by condition.

### 15.3.2 Paper size detection control

#### A. Size detection in the main scan direction

According to the position of the guide plate connected to the paper size VR/BP (VR1), the paper size is detected in the main scan direction.

#### B. Size detection in the sub scan direction

The paper size is detected by the combination of the ON/OFF of the paper size sensors /BP1 (PS19), /BP2 (PS20), /BP3 (PS21) and /BP4 (PS22).

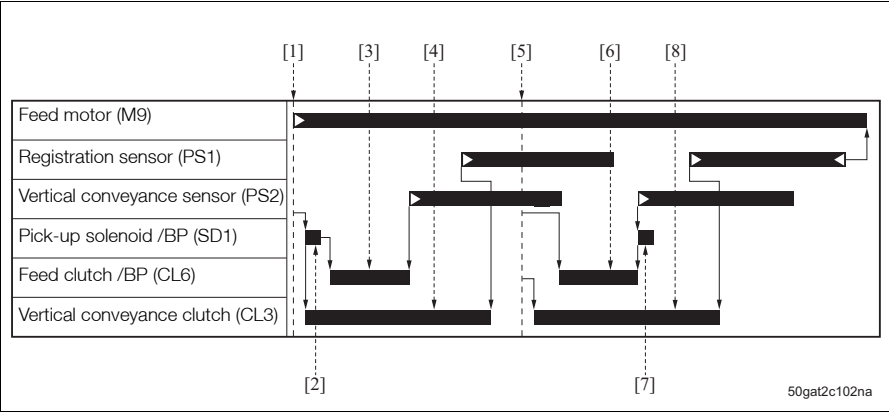
#### C. Paper size detection table

Paper size	Paper size sensors				Paper size VR/BP (VR1) detection width (mm)
	BP1 (PS19)	BP2 (PS20)	BP3 (PS21)	BP4 (PS22)	
A6S	OFF	OFF	OFF	OFF	80 or more - less than 115
B6S					115 or more - 144 or less
A5					196 or more - 225 or less
B5					242 or more - 268 or less
A5S	ON	OFF	OFF	OFF	133 or more - 164 or less
B5S					169 or more - less than 196
A4S					196 or more - 225 or less
8½ x 11					225 or more - less than 288
A4					288 or more - 330 or less
Foolscap	ON	ON	OFF	OFF	188 or more - 235 or less
8½ x 14	ON	ON	ON	OFF	201 or more - 231 or less
B4					242 or more - less than 268
11 x 17	ON	ON	ON	ON	255 or more - less than 288
A3					288 or more - less than 301

15.3.3 Paper feed control

A. Pick-up control

When the feed motor (M9) is turned ON by the print start signal [1], the pick-up solenoid /BP (SD1) and the vertical conveyance clutch (CL3) also turn ON a specified period of time after that. When SD1 turns ON, the lift plate goes up [2] and paper comes into contact with the feed roller. After that, the feed clutch /BP (CL6) turns ON. Through these operations, the driving force of M9 is transmitted to the feed roller and the vertical conveyance roller to conduct the pick-up [3] and the vertical conveyance [4] of the 1st sheet of paper. When paper is conveyed and the vertical conveyance sensor (PS2) turns ON, CL6 turns OFF to complete the pick-up operation. However, since CL3 keeps turning ON, paper is conveyed to the registration section by the vertical conveyance roller. In this way, when the registration sensor (PS1) turns ON, CL3 turns OFF a specified period of time after that. The pick-up [6] and the vertical conveyance [8] of the 2nd and succeeding sheets of paper are conducted using the paper feed request signal [5] as a starting point. When the last paper turns ON PS2, SD1 turns ON to bring down [7] the lift plate.



- [1] Print start signal ON

[2] Lift plate goes up

[3] Pick-up of the 1st paper

[4] Vertical conveyance of the 1st paper
- [5] Paper feed request signal

[6] Pick-up of the 2nd paper

[7] Lift plate goes down

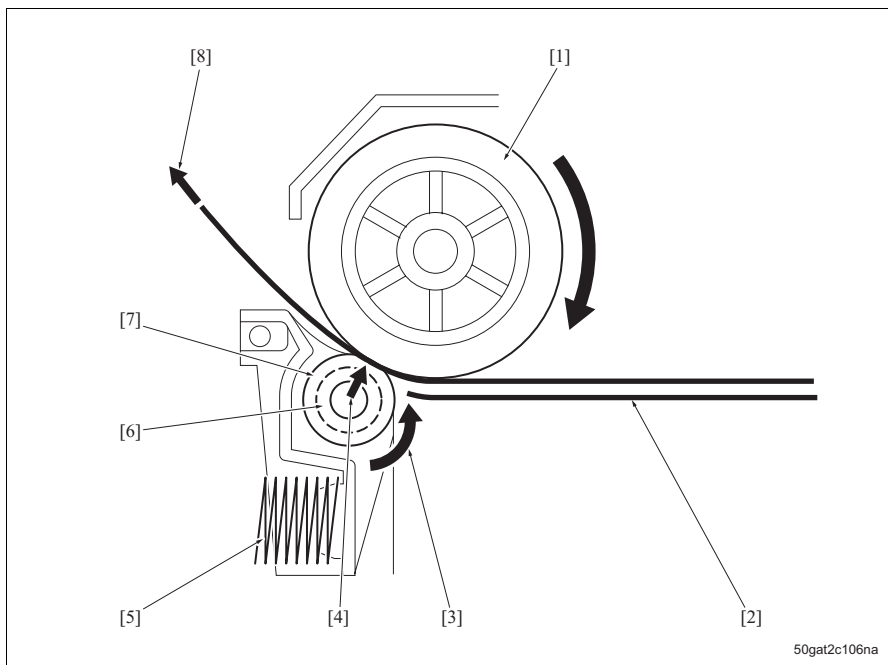
[8] Vertical conveyance of the 2nd paper

## B. Separation mechanism

The separation roller [7] is pressed against the feed roller [1] by the pressure [4] of the spring [5] and the torque of the torque limiter [6]. This operating pressure of the feed roller, separation roller and torque limiter becomes a limit torque to prevent the double feed of paper.

When there is no paper between the separation roller and the feed roller, or when only one sheet of paper is conveyed, the operating pressure of the feed roller, the paper and the spring is in excess of the limit torque, and therefore, the separation roller rotates [3] following the rotation of the feed roller.

When two or more sheets of paper are conveyed between the separation roller and the feed roller, the limit torque is greater than the frictional force between 2 sheets of paper, and accordingly, the separation roller stops and the lower side paper [2] in contact with the separation roller is not conveyed.



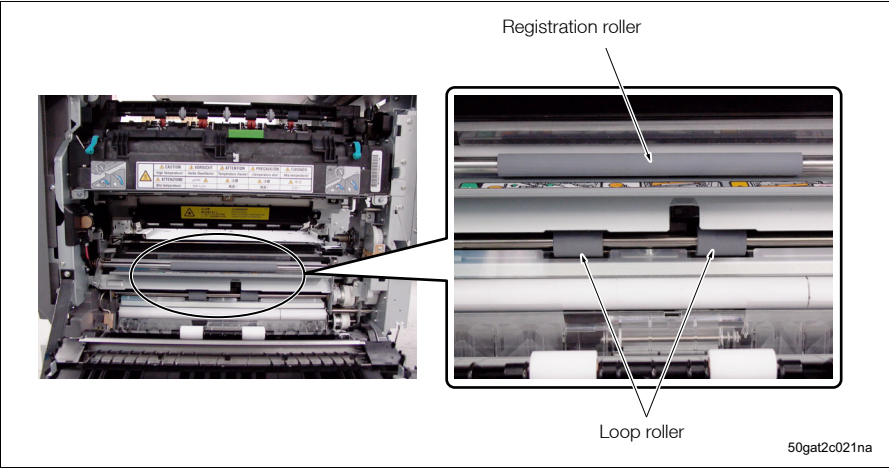
- |                        |                                |
|------------------------|--------------------------------|
| [1] Feed roller        | [5] Spring                     |
| [2] 2nd sheet of paper | [6] Torque limiter             |
| [3] Driven rotation    | [7] Separation roller          |
| [4] Pressing           | [8] Paper conveyance direction |

### 15.3.4 Paper empty control

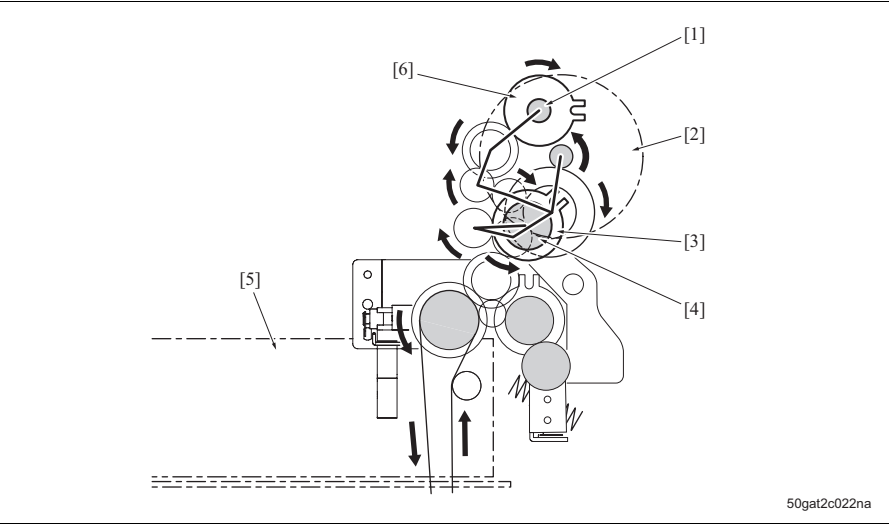
The paper empty of the tray is detected by the paper empty sensor /BP (PS18).

16.REGISTRATION SECTION

16.1 Composition



16.2 Drive



- |                         |                               |
|-------------------------|-------------------------------|
| [1] Registration roller | [4] Loop roller               |
| [2] Feed motor (M9)     | [5] Tray 1                    |
| [3] Loop clutch (CL2)   | [6] Registration clutch (CL1) |

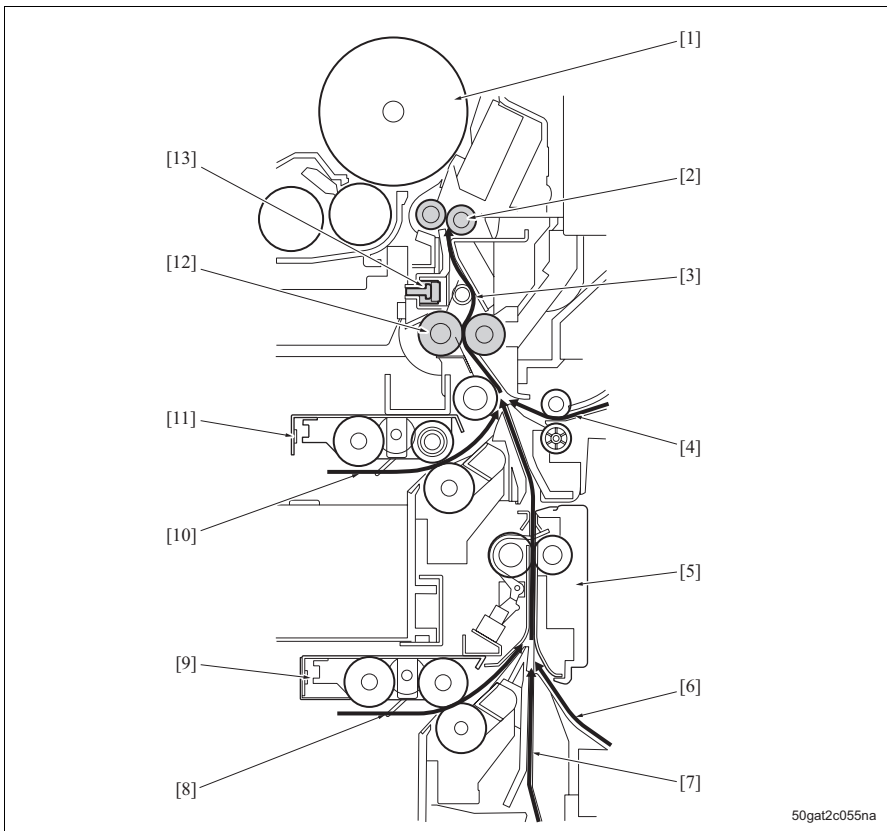
## 16.3 Operation

### 16.3.1 Loop control

#### A. Registration path

Paper fed from the tray 1 [10], the tray 2 [8], the by-pass tray [6], PC/LU [7] and ADU [4] hits against the registration roller [2] through the loop roller [12]. And until the loop roller turns OFF, a loop is formed [3] and a paper skew is corrected.

The loop roller is driven by the feed motor (M9) and the loop of paper is controlled by the registration sensor (PS1) [13] equipped just before the registration roller.



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- |                                   |                                |
|-----------------------------------|--------------------------------|
| [1] Drum                          | [8] Tray 2 paper conveyance    |
| [2] Registration roller           | [9] Paper feed unit /2         |
| [3] Loop                          | [10] Tray 1 paper conveyance   |
| [4] ADU paper conveyance          | [11] Paper feed unit /1        |
| [5] Vertical conveyance section   | [12] Loop roller               |
| [6] By-pass tray paper conveyance | [13] Registration sensor (PS1) |
| [7] PC/LU paper conveyance        |                                |

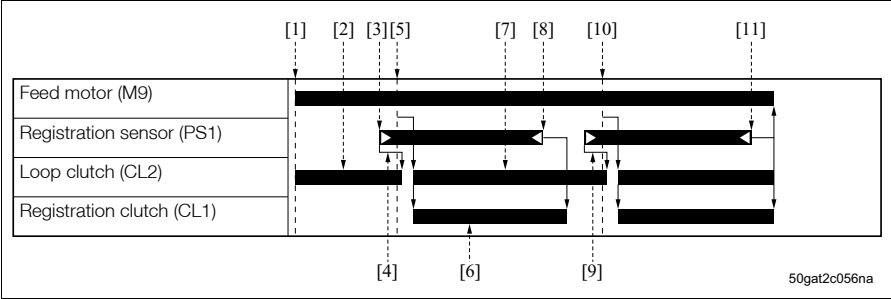
**B. Registration operation**

The feed motor (M9) and the loop clutch (CL2) are turned ON by the print start signal [1]. In this way, the driving force of M9 is transmitted to the loop roller and paper conveyed from each of the paper feed sections is conveyed to the registration roller. When the registration sensor (PS1) detects the leading edge of paper and turns ON [3], CL2 turns OFF a specified period of time after that. At this time, since paper is being conveyed for a specified period of time after being hit against the registration roller, a loop [4] is formed and a paper skew is corrected.

The print signal [5] turns ON the registration clutch (CL1) to transmit the driving force of M9 to the registration roller. At this time, CL2 also turns ON to drive the loop roller for a loop assist [7].

When PS1 detects the trailing edge of paper and turns OFF [8], CL1 also turns OFF a specified period of time after that to complete the registration operation. However, CL2 keeps tuning ON to conduct a loop formation [9] of the next paper. After that, the same operations are repeated.

When PS1 detects the trailing edge of the last paper and turns OFF [11], M9, CL1 and CL2 also turn OFF a specified period of time after that to complete a series of registration operations.

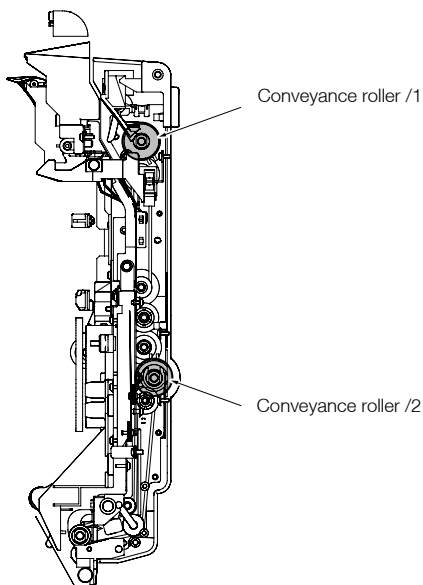


- |  |   |
|--|---|
| [1] Print start signal   | [8] Detection of the trailing edge of the 1st paper   |
| [2] Conveyance of the 1st paper                                  | [9] Loop formation of the 2nd paper                   |
| [3] Detection of the leading edge of 1st paper                   | [10] Print signal for the 2nd paper                   |
| [4] Loop formation of the 1st paper                              | [11] Detection of the trailing edge of the last paper |
| [5] Print signal for the 1st paper                               |   |
| [6] 1st paper registration roller ON                             |   |
| [7] Loop assist of the 1st paper, and conveyance of 2nd of paper |   |



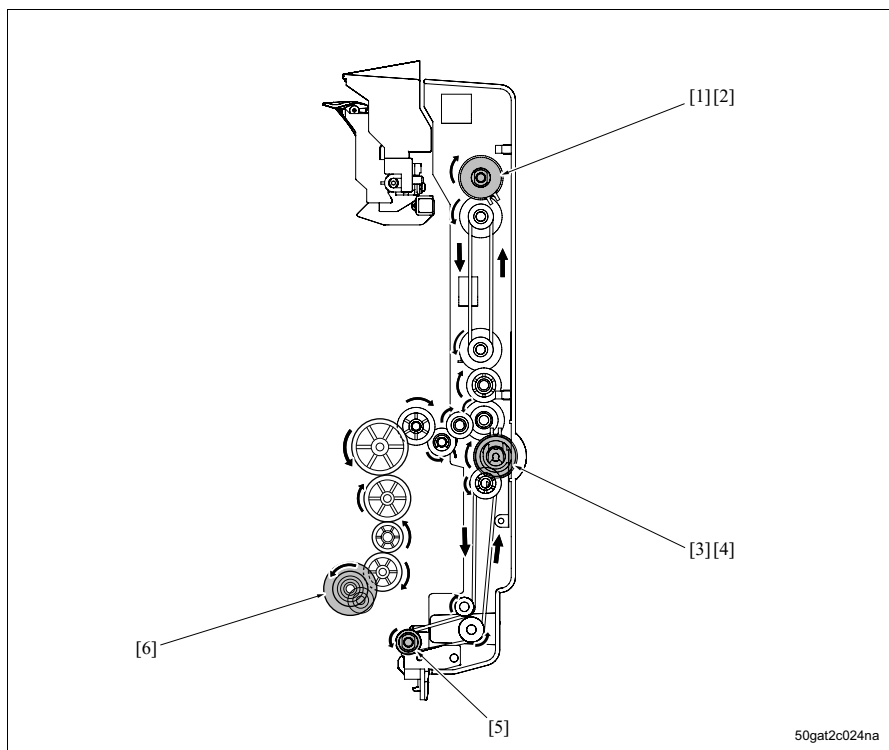
## 17.ADU SECTION

### 17.1 Composition



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## 17.2 Drive



[1] ADU conveyance clutch /Up (CL7)

[2] Conveyance roller /1

[3] ADU conveyance clutch /Lw (CL8)

[4] Conveyance roller /2

[5] Conveyance roller /3

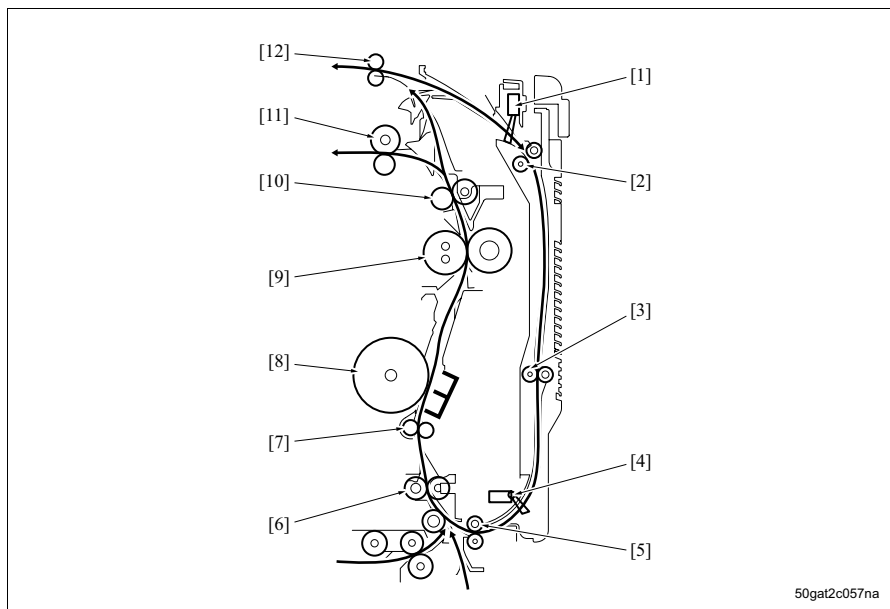
[6] Feed motor (M9)

## 17.3 Operation

### 17.3.1 Conveyance path

Paper the one side of which has been printed is conveyed to ADU by the reverse roller [12]. The paper conveyed to ADU is also conveyed to the loop roller [6], the registration roller [7] and the drum [8] by the conveyance rollers /1 [2], /2 [3] and /3 [5] and the other side is printed. Paper both sides of which has been printed passes through the fusing roller [9] and fusing exit roller [10] to be exited from the main body paper exit roller [11].

The conveyance rollers /1, /2 and /3 are driven by the feed motor (M9), but the ON/OFF of the conveyance roller /1 is controlled by the ADU conveyance clutch /Up (CL7) and that of the conveyance rollers /2 and /3 controlled by the ADU conveyance clutch /Lw (CL8). This control is used to prevent the interference of each sheet of paper that circulates through the conveyance path when two or more sheets of paper are printed. And, to detect the position of paper that is circulating, the ADU conveyance sensor /1 (PS24) [1] and /2 (PS25) [4] are equipped.



- |                                     |                                  |
|-------------------------------------|----------------------------------|
| [1] ADU conveyance sensor /1 (PS24) | [7] Registration roller          |
| [2] Conveyance roller /1            | [8] Drum                         |
| [3] Conveyance roller /2            | [9] Fusing roller                |
| [4] ADU conveyance sensor /2 (PS25) | [10] Fusing exit roller          |
| [5] Conveyance roller /3            | [11] Main body paper exit roller |
| [6] Loop roller                     | [12] Reverse roller              |

17.3.2 Conveyance control

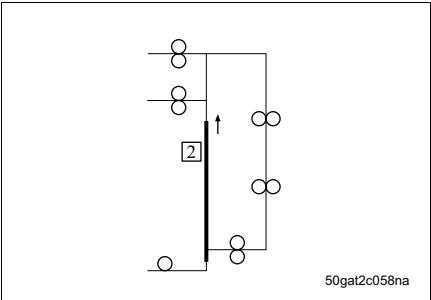
When printing two or more sheets of paper in the double sided print mode, the conveyance control in ADU varies according to the length of paper in the sub scan direction. The following 3 control methods are provided for the conveyance control.

Conveyance control	Length of applicable paper in the sub scan direction
1 sheet self-contained double sided print	B4 (364 mm) to Ledger (431.8 mm)
2 sheets self-contained double sided print	Letter (215.9 mm) to B4 (364 mm)
3 sheets self-contained double sided print	B5 (182 mm) to Letter (215.9 mm)

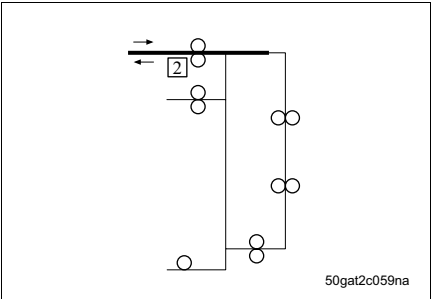
A. 1 sheet self-contained double sided print operation

Note

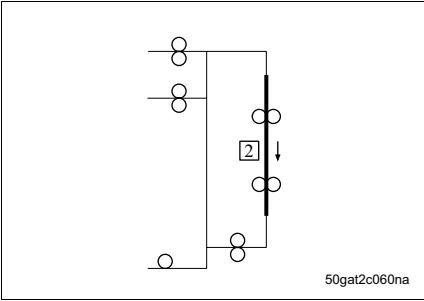
- A figure in the illustration (shown in the square) represents the page number.



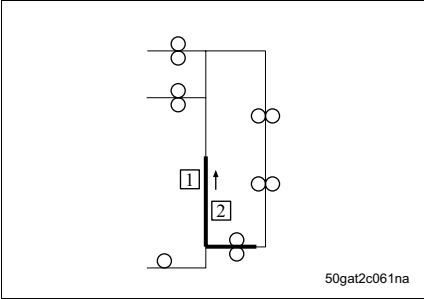
1. With the 1st sheet of paper fed, the image of the 2nd page (the back side of the 1st sheet of paper when the original is double sided) is printed.



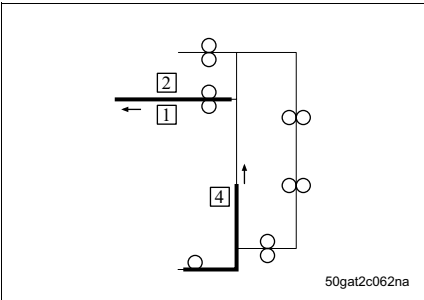
2. The 1st sheet of paper is conveyed to the paper reverse/exit section, and then conveyed to ADU after being turned over.



3. The 1st sheet of paper in ADU is conveyed without interruption.



4. The 1st sheet of paper is fed again and the image of the 1st page (the front side of the 1st sheet of paper when the original is double sided) is printed.

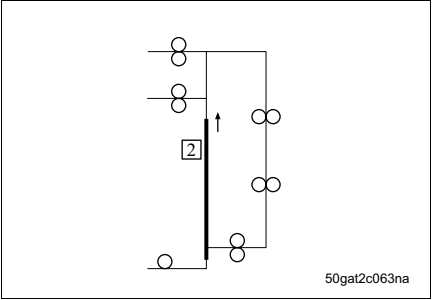


5. With the 2nd sheet of paper fed while exiting the 1st sheet of paper, the image of the 4th page (the back side of the 2nd sheet of paper when the original is double sided) is printed.
6. After this, the procedure of steps 2 to 5 is repeated.

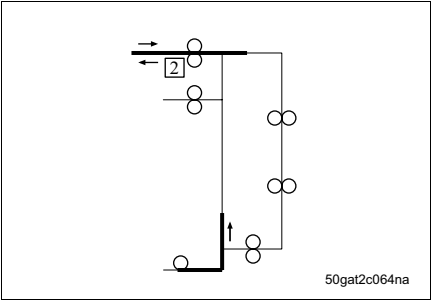
**B. 2 sheets self-contained double sided print operation**

**Note**

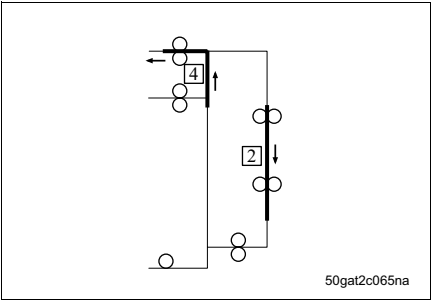
- A figure in the illustration (shown in the square) represents the page number.



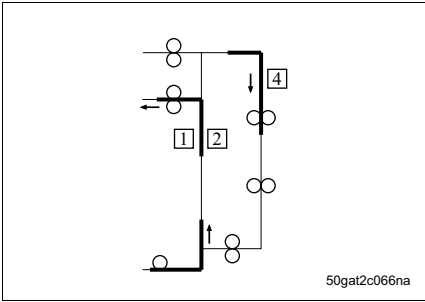
1. With the 1st sheet of paper fed, the image of the 2nd page (the back side of the 1st sheet of paper when the original is double sided) is printed.



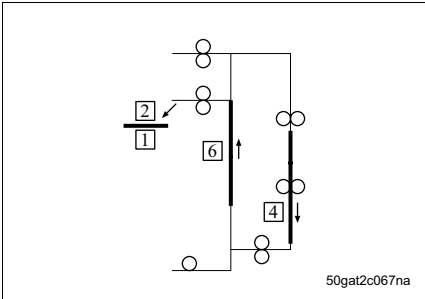
2. The 1st sheet of paper is conveyed to the paper reverse/exit section and then conveyed to ADU after being turned over. At this time, the 2nd sheet of paper is fed.



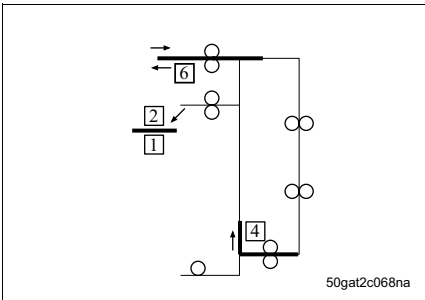
3. The image of the 4th page (the back side of the 2nd sheet of paper when the original is double sided) is printed on the 2nd sheet of paper. At this time, the 1st sheet of paper is conveyed into ADU.



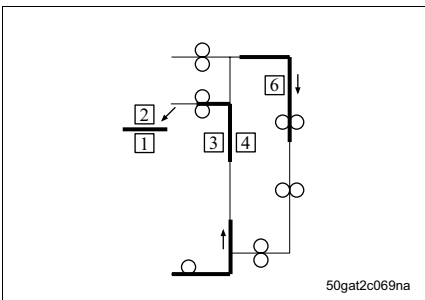
4. The 1st sheet of paper is fed again and the image of the 1st page (the front side of the 1st sheet of paper when the original is double sided) is printed. At this time, the 3rd sheet of paper is fed and the 2nd sheet of paper is turned over at the paper reverse/exit section to be conveyed into ADU.



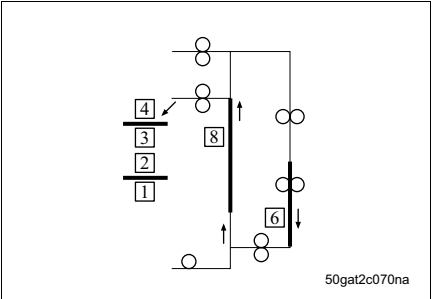
5. While the 1st sheet of paper is being exited, the image of the 6th page (the back side of the 3rd sheet of paper when the original is double sided) is printed on the 3rd sheet of paper. At this time, the 2nd sheet of paper is standing by on this side of the conveyance roller /3.



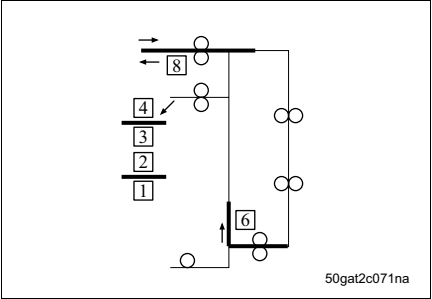
6. The 3rd sheet of paper is conveyed to ADU after being turned over at the paper reverse/exit section. At this time, the 2nd sheet of paper that has been standing by is fed again.



7. The image of the 3rd page (the front side of the 2nd sheet of paper when the original is double sided) is printed on the 2nd sheet of paper. At this time, the 3rd sheet of paper has been conveyed into ADU and the 4th sheet of paper is fed at the same time.



8. While the 2nd sheet of paper is being exited, the image of the 8th page (the back side of the 4th sheet of paper when the original is double sided) is printed on the 4th sheet of paper. At this time, the 3rd sheet of paper is standing by on this side of the conveyance roller /3.



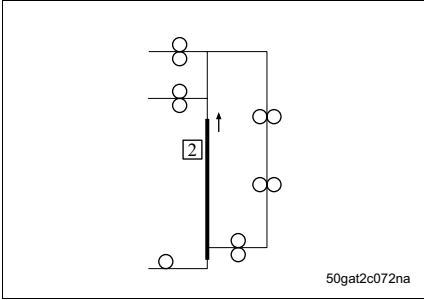
9. The 4th sheet of paper is turned over at the paper reverse/exit section to be conveyed to ADU. At this time, the 3rd sheet of paper that has been standing by is fed again.
10. After this, the procedure of steps 7 to 9 is repeated.



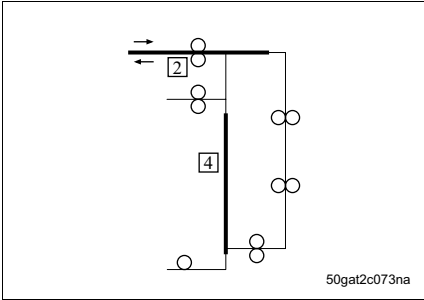
### C. 3 sheets self-contained double sided print operation

#### Note

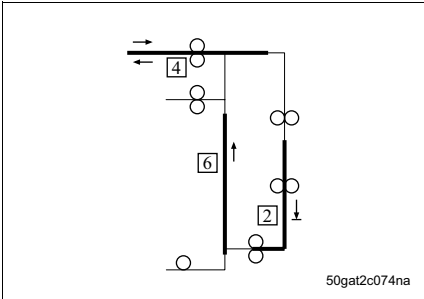
- A figure in the illustration (shown in the square) represents the page number.



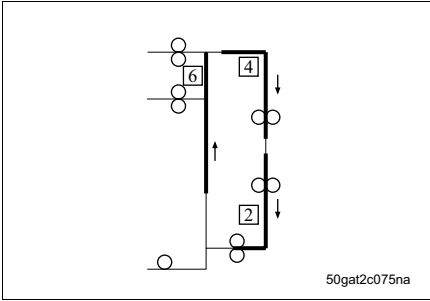
1. The 1st sheet of paper is fed and the image of the 2nd page (the back side of the 1st sheet of paper when the original is double sided) is printed.



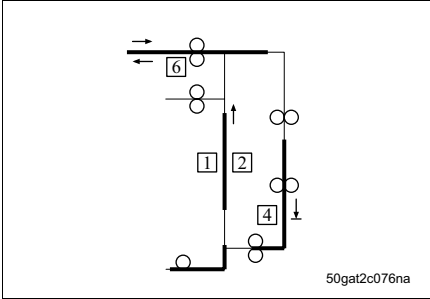
2. The 1st sheet of paper is conveyed to the paper reverse/exit section and then conveyed to ADU after being turned over. At this time, the 2nd sheet of paper is fed and the image of the 4th page (the back side of the 2nd sheet of paper when the original is double sided) is printed.



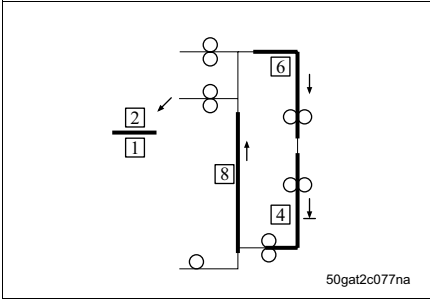
3. The 1st sheet of paper is standing by at the conveyance roller /3. The 2nd sheet of paper is turned over at the paper reverse/exit section to be conveyed to ADU. At this time, the 3rd sheet of paper is fed and the image of the 6th page (the back side of the 3rd sheet of paper when the original is double sided) is printed.



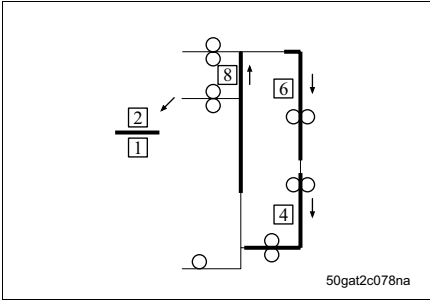
4. The 3rd sheet of paper is conveyed to the paper reverse/exit section and the 2nd sheet of paper is conveyed in ADU without interruption. However, the 1st sheet of paper remains standing by at the conveyance roller /3.



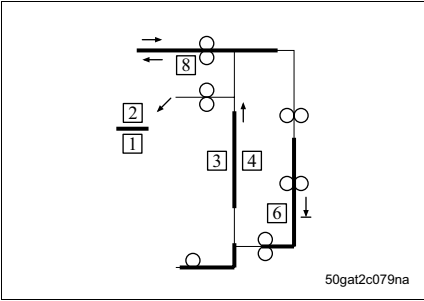
5. The 1st sheet of paper is fed again and the image of the 1st page (the front side of the 1st sheet of paper when the original is double sided) is printed. At this time, the 3rd sheet of paper is turned over to be sent to ADU and the 2nd sheet of paper is standing by at the conveyance roller /3. In this way, the 4th sheet of paper is fed.



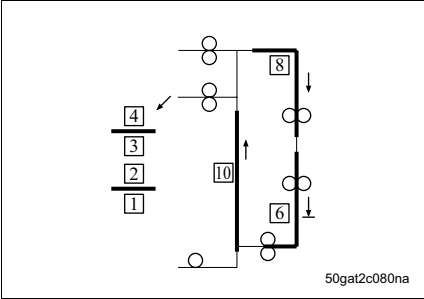
6. While the 1st sheet of paper is being exited, the image of the 8th page (the back side of the 4th sheet of paper when the original is double sided) is printed on the 4th sheet of paper. At this time, since the 2nd sheet of paper is standing by at the conveyance roller /3, the 3rd sheet of paper stops when the interval between this sheet and the 2nd sheet of paper comes to the prescribed distance.



7. The 4th sheet of paper is conveyed to the paper reverse/exit section. At this time, the conveyance of the 2nd and the 3rd sheets of paper resumes in ADU.



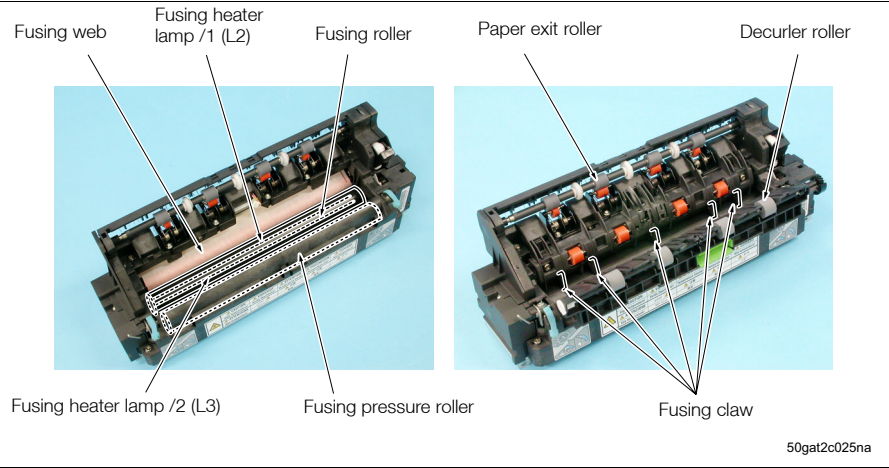
8. The 2nd sheet of paper is fed again and the image of the 3rd page (the front side of the 2nd sheet of paper when the original is double sided) is printed. The 4th sheet of paper is turned over to be sent to ADU with the 3rd sheet of paper standing by at the conveyance roller /3. In this way, the 5th sheet of paper is fed.



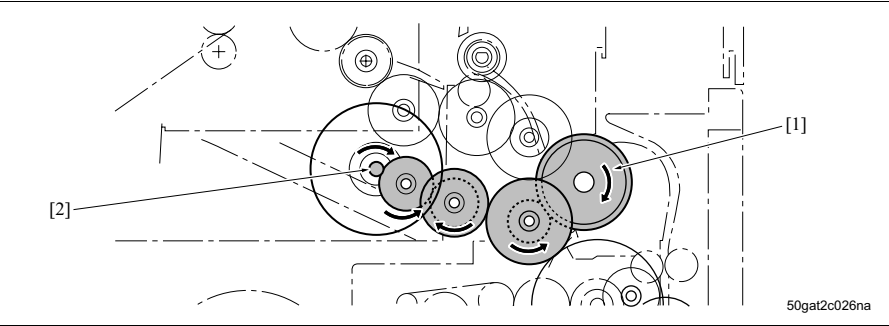
9. While the 2nd sheet of paper is being exited, the image of the 10th page (the back side of the 5th sheet of paper when the original is double sided) is printed on the 5th sheet of paper. At this time, since the 3rd sheet of paper is standing by at the conveyance roller /3, the 4th sheet of paper stops when the interval between this sheet and the 3rd sheet of paper comes to the prescribed distance. 10. After this, the procedure of steps 7 to 9 is repeated.

# 18. FUSING SECTION

## 18.1 Composition



## 18.2 Drive



[1] Fusing unit drive

[2] Fusing motor (M11)

## 18.3 Operation

### 18.3.1 Fusing roller drive control

#### A. Speed switchover control

The process speed is switched over between the high speed and the low speed according to the type of paper selected in the paper setting of the setup menu. However, the low speed is applicable in the thick paper, envelop, OHP, and label paper mode.

Machine type	Normal	Thick paper, envelop, OHP and label paper mode
bizhub 501	250mm/s	125mm/s
bizhub 421/361	210mm/s	

#### B. Preliminary rotation control

While in the warm-up, the preliminary rotation is conducted for the fusing roller and the fusing pressure roller.

The time of preliminary rotation varies according to the detected temperature of the drum temperature sensor and the thermistors /1 (TH1) and /2 (TH2). And the starting temperature of the preliminary rotation varies for bizhub 501 and 421/361.

#### C. Rotation control while in the print

The fusing motor (M11) that drives the fusing roller and the fusing pressure roller is turned ON by the print start signal. And it turns OFF a specified period of time after the fusing exit sensor (PS3) detects the trailing edge of the last paper.

While in the print with paper stopping at the registration section, the fusing roller and the fusing pressure roller run idle. In this way, the fusing temperature gets near to the set temperature for each type of paper selected in the paper setting of the setup menu.

### 18.3.2 Web drive control

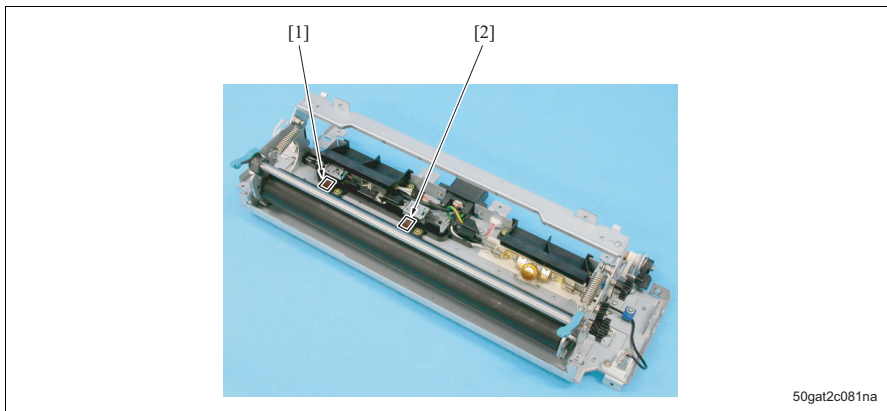
The fusing web is driven by the web solenoid (SD4).

The number of ON times is controlled by SD4 according to the web count of the fixed part counter so that the web shift amount per print becomes constant.

### 18.3.3 Fusing temperature control

The fusing roller is heated by the fusing heater lamps /1 (L2) and /2 (L3). The fusing pressure roller is heated by the thermal conduction from the fusing roller.

The surface temperature of the fusing roller is detected by the thermistors /1 (TH1) [2] and /2 (TH2) [1]. TH1 and TH2 monitor the surface temperature of the fusing roller at specified intervals to control the ON/OFF of L2 and L3 through the AC drive circuit in the DC power supply (DCPS) so that a prescribed temperature can be obtained.



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[1] Thermistor /2 (TH2)

[2] Thermistor /1 (TH1)

#### A. Warm-up

Warm-up is conducted when the main power switch (SW1), the power switch (SW2) and the interlock switch (MS) turn ON, and also when the system returns from the low power mode or the sleep mode.

While in the warm-up, the fusing heater lamps /1 (L2) and /2 (L3) turn ON. And it turns OFF at the prescribed temperature. The temperature at which the warm-up completes varies for bizhub 501 and 421/361.

#### B. While in the print

The set temperature of the fusing roller varies according to the type of paper and the paper size. The ON/OFF of the fusing heater lamps /1 (L2) and /2 (L3) are controlled so that the prescribed temperature is obtained.

When plain paper or thick paper is selected, to prevent the set temperature from going down due to the passage of paper, the set temperature is raised up to the prescribed temperature for a specified period of time from the start of printing for each print.

When the fusing roller and the fusing pressure roller are stopped due to the completion or interruption of the print, each roller is kept running for a specified period of time after L2 and L3 turn OFF to avoid an overshoot.

#### C. While in the stand-by

While in the stand-by condition, the temperature of the fusing roller is controlled in 3 steps according to the elapsed time after the completion of warm-up or printing, whether DF is opened or closed, and whether each key is pushed down or not.

While in the stand-by, the ON/OFF of the fusing heater lamps /1 (L2) and /2 (L3) are controlled so that the fusing roller gets to the prescribed temperature.

Through these control operations, an overshoot is avoided and fusibility immediately after the release from the stand-by condition is secured.

#### D. Low power mode and sleep mode

When each key is not pressed within a specified period of time after the completion of the last print, the system changes into the low power mode or the sleep mode. The starting time for operation can be set individually for the low power mode and the sleep mode. When the same starting time for operation is set for both modes, the sleep mode takes precedence over the low power mode.

When the system changes into the low power mode, the ON/OFF of the fusing heater lamps /1 (L2) and /2 (L3) is controlled so that the fusing roller gets to the prescribed temperature. The controlled temperature at this time becomes lower than other controlled temperatures. And when the system changes into the sleep mode, the power supply to L2 and L3 is shut off to put the system in the stand-by condition.

### 18.3.4 Fusing roller edge cooling control

#### A. Purpose

When printing continuously the sheets of paper the size of which is short in the main scan direction, the temperature gets high at both edges of the fusing roller and the fusing pressure roller where no paper passages is made. So, to prevent the temperature from getting high, the edges of each roller are cooled down by the fusing cooling fans /Fr (FM2) and /Rr (FM8). This control operation is also conducted to avoid a fusing overshoot when the main body makes an emergency stop due to the occurrence of a jam.

#### B. Fusing cooling fan control

The fusing cooling fans /Fr (FM2) and /Rr (FM8) vary depending on whether the size of paper in the main scan direction is large or small. And their operations also vary when a jam occurs.

##### (1) Small size

Small size paper refers to the one the size of which is 200 mm or less in the main scan direction.

- ON timing  
When the fusing exit sensor (PS3) detects the leading edge of paper exited and turns ON.
- OFF timing  
When the fusing motor (M11) turns OFF.

##### (2) Large size

Large size paper refers to the one the size of which is 201 mm or more in the main scan direction.

- ON timing  
When the detected temperature of the thermistor /2 (TH2) is over the prescribed temperature.
- OFF timing  
When the detected temperature of TH2 goes down below the prescribed temperature.

##### (3) When a jam occurs.

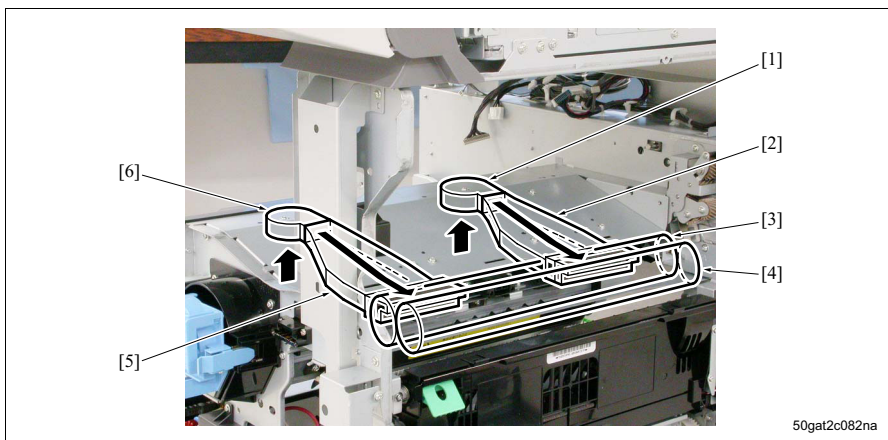
- ON timing  
A jam is detected inside the main body.
- OFF timing  
A specified period of time after the fusing cooling fans /Fr (FM2) and /Rr (FM8) turn ON.

#### Note

- **When the power switch (SW2) turns OFF due to the occurrence of a jam, or when the interlock switch (MS) is turned OFF by opening ADU, the power supply to each fan is shut off and, even if it is within a specified period of time, the fan turns OFF. However, when SW2 and MS are turned ON within a specified period of time, FM2 and FM8 turn ON again.**

### C. Fusing cooling path

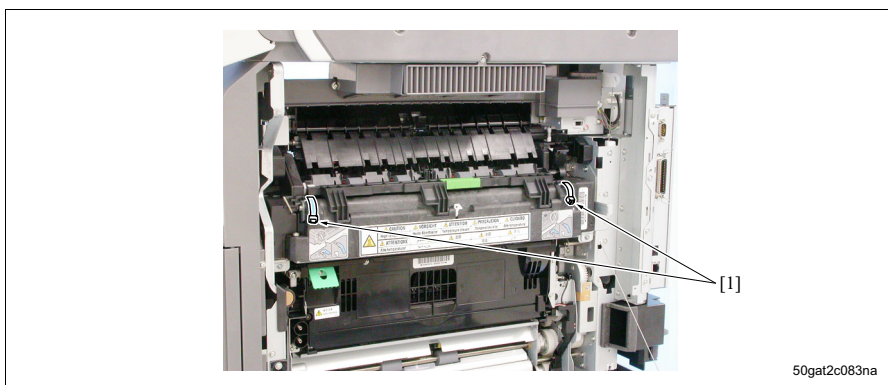
The air inside the machine is sucked in by the fusing cooling fans /Fr (FM2) [6] and /Rr (FM8) [1] to be blown against the edges of the fusing roller [3] through the ducts [2] and [5]. In this way, the edges of the fusing roller are cooled down and the surface temperature of the edges of the fusing pressure roller [4] that is in contact also goes down.



- |                                  |                                  |
|----------------------------------|----------------------------------|
| [1] Fusing cooling fan /Rr (FM8) | [4] Fusing pressure roller       |
| [2] Duct                         | [5] Duct                         |
| [3] Fusing roller                | [6] Fusing cooling fan /Fr (FM2) |

#### 18.3.5 Envelope conveyance mechanism

When printing envelopes, to prevent the occurrence of paper crease due to the thickness of paper, it is possible to switch the nip pressure of the fusing roller and the fusing pressure roller. The nip pressure is manually switched by the envelope lever [1].



- [1] Envelope lever

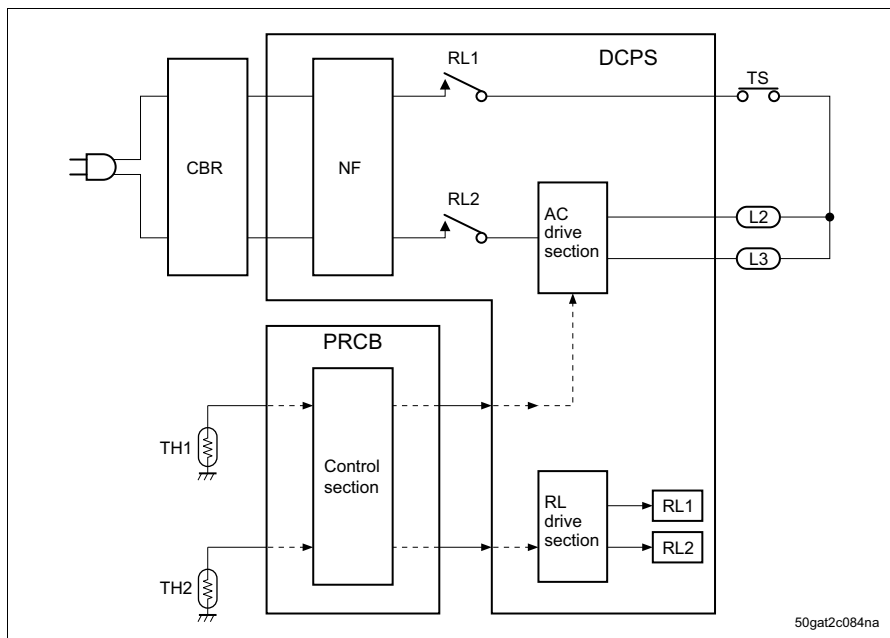


### 18.3.6 Protection against abnormality

When the thermistors /1 (TH1) and /2 (TH2) detects a stipulated temperature (233°C) 5 times at the prescribed intervals, this is deemed to be a high temperature abnormality and the fusing heater lamps /1 (L2) and /2 (L3) are turned OFF. The thermostat (TS) also monitors an abnormal temperature rise and, when the detected temperature gets to  $220 \pm 10^\circ\text{C}$ , the AC power lines to L2 and L3 are shut off.

For each condition in the warm-up, print, stand-by and the low power modes, the detected temperatures of TH1 and TH2 and the number of times when L2 and L3 turned ON are calculated. And it is considered that a low temperature abnormality occurs when certain conditions are met. When a low temperature abnormality occurs, the power supply to L2 and L3 is cut off.

When these fusing temperature abnormalities occur, the system is placed in the SC latch condition with a message shown in the touch panel. After repairing with the cause of abnormality identified, it is necessary to release the SC latch by the software DipSW3-1 for restoration.

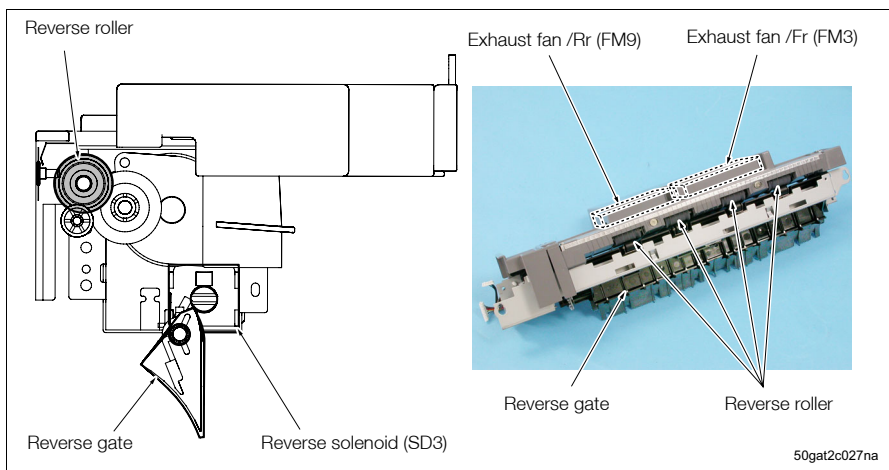


### 18.3.7 Jam detection control

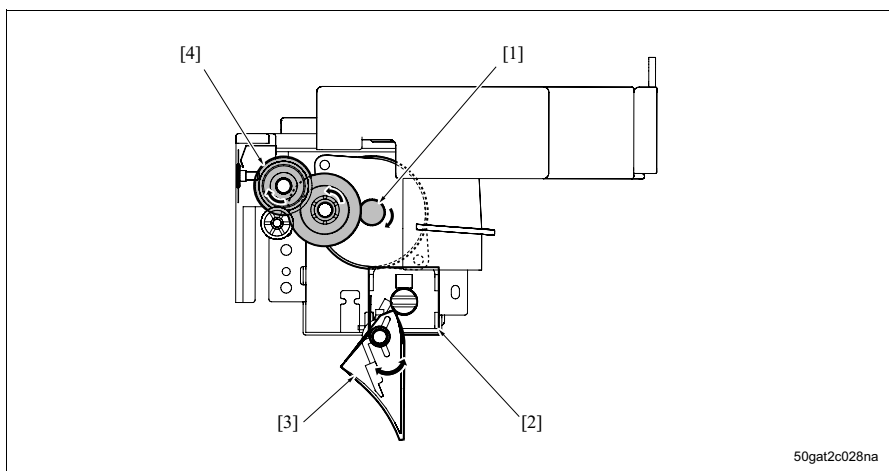
Only while in the print, when the detected temperatures of the thermistors /1 (TH1) and /2 (TH2) go down in a moment more than the prescribed temperature, this is considered as a wind-up jam and the operation of the main body is stopped with a message shown in the touch panel.

## 19. REVERSE/EXIT SECTION

### 19.1 Composition



### 19.2 Drive



- [1] Reverse motor (M6)
- [2] Reverse solenoid (SD3)

- [3] Reverse gate
- [4] Reverse roller

## 19.3 Operation

### 19.3.1 Conveyance control

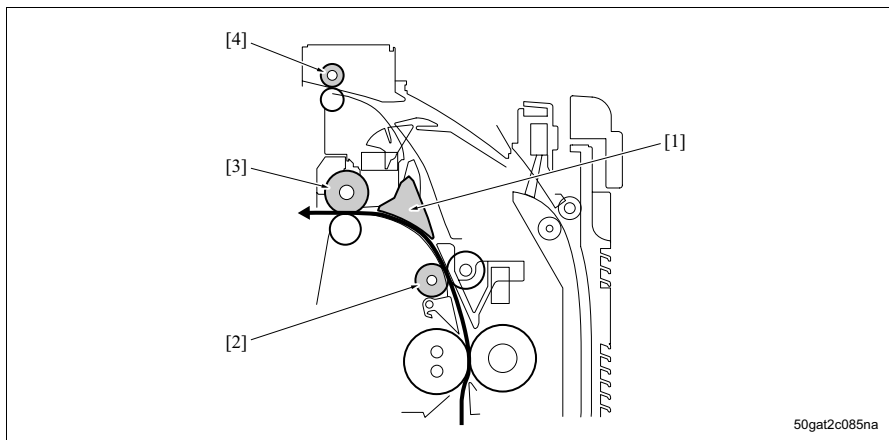
#### A. Reverse gate

The reverse gate is driven by the ON/OFF of the reverse solenoid (SD3). Paper conveyed from the fusing section is switched by the reverse gate between the paper exit section and the reverse section.

#### B. Conveyance path

##### (1) Paper exit path

The reverse solenoid (SD3) is normally turned OFF and the reverse gate [1] is held in the position in which it blocks the conveyance path to the reverse roller [4]. In this manner, paper conveyed from the fusing exit roller (decurler roller) [2] is guided to the main body paper exit roller [3] along the internal form of the reverse gate to be exited.



[1] Reverse gate

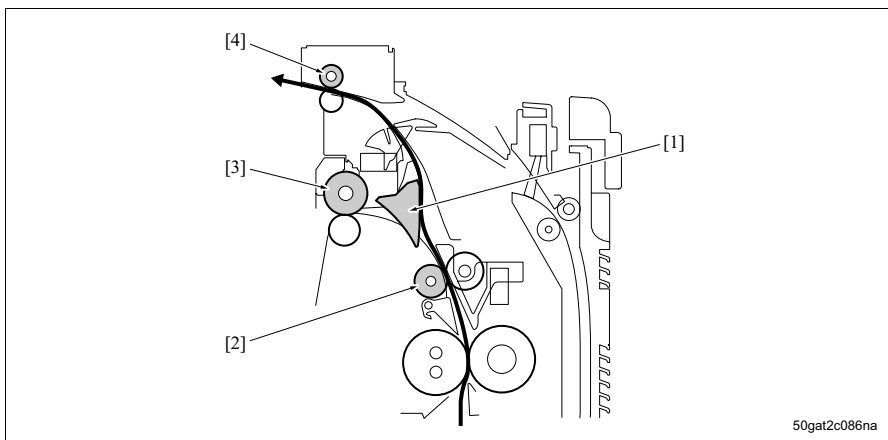
[2] Fusing exit roller (decurler roller)

[3] Main body paper exit roller

[4] Reverse roller

**(2) Reverse path**

While in the double sided print, the reverse solenoid (SD3) turns ON when the print on the back side is completed, and the reverse gate [1] is switched in the direction in which the conveyance path to the reverse roller [4] is opened. In this way, paper conveyed from the fusing exit roller (decurler roller) [2] is guided to the reverse roller along the external form of the reverse gate.



[1] Reverse gate

[3] Main body paper exit roller

[2] Fusing exit roller (decurler roller)

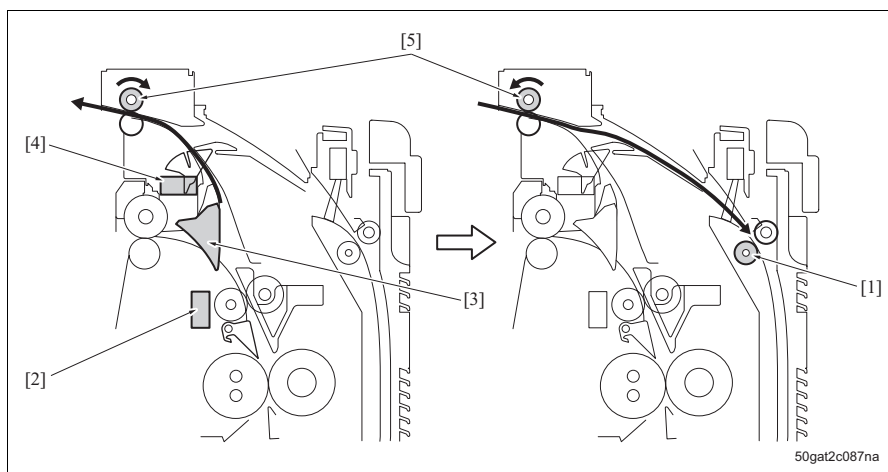
[4] Reverse roller

### 19.3.2 Reverse control

#### A. Switch-back mechanism

While in the double sided print, paper that passes through the reverse gate [3] is conveyed to the outside of the main body by the reverse roller [5] and then sent back again to the inside of the main body. At this time, the paper is guided to the conveyance roller /1 [1] side, not to the reverse gate side from the metal frame form of the conveyance path. In this way, the paper is turned over to be conveyed to the registration section again through ADU.

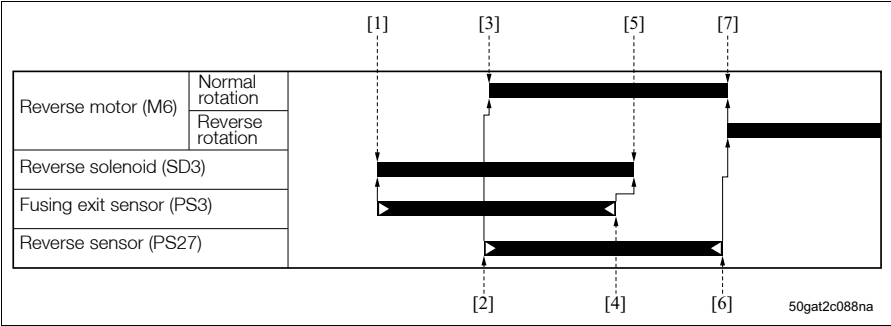
The ON/OFF timing of the reverse solenoid (SD3) that drives the reverse gate is controlled by the fusing exit sensor (PS3) [2]. And the switchover between the normal rotation and the reverse rotation of the reverse motor (M6) that drives the reverse roller is controlled by the reverse sensor (PS27) [4].



- |                              |                           |
|------------------------------|---------------------------|
| [1] Conveyance roller /1     | [4] Reverse sensor (PS27) |
| [2] Fusing exit sensor (PS3) | [5] Reverse roller        |
| [3] Reverse gate             |                           |

B. Reverse control

While in the double sided print, when the fusing exit sensor (PS3) detects the leading edge of paper of which the printing of the back side has been completed and turns ON [1], the reverse solenoid (SD3) turns ON to switch the reverse gate a specified period of time after the registration clutch (CL1) turns ON for back side printing. In this manner, the paper is conveyed to the reverse section. A specified period of time after the reverse sensor (PS27) detects the leading edge of paper and turns ON [2], the reverse motor (M6) rotates in the normal direction [3] and the reverse roller conveys the paper to the outside of the main body. And then, a specified period of time after PS3 detects the trailing edge of the paper and turns OFF [4], SD3 turns OFF [5] to bring the reverse gate back to its original position. And when PS27 detects the trailing edge of the paper and turns OFF [6], the rotation of M6 is switched [7] from the normal rotation to the reverse rotation and the reverse roller sends the paper back to the inside of the main body to convey it to ADU. In this manner, the paper is turned over.



- [1]

Switchover of the reverse gate
- [2]

Detection of the leading edge of paper
- [3]

Normal rotation of the reverse roller ON
- [4]

Detection of the trailing edge of paper
- [5]

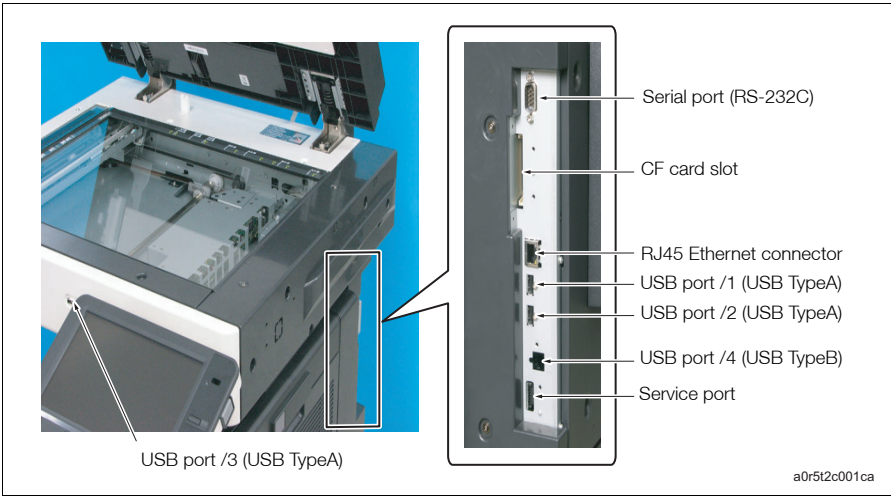
Return to the reverse gate
- [6]

Detection of the trailing edge of paper
- [7]

Switchover of the reverse roller from the normal rotation to the reverse rotation

20.INTERFACE SECTION

20.1 Composition



20.2 Specifications

Item	Specifications
Serial port (RS-232C)	For CS Remote Care
CF card slot	System management for CF card CF card stored the following pro-grams and the datas 1. MFP controller program (Firmware) 2. The datas (Utility/Administrator Setting Data, Destination Storage Data, CS Remote Care Setting Data, All History Data) that initial-ized in the [System 1]-[Initializa-tion] of the service mode 3. HDD serial number 4. HDD model type
RJ45 Ethernet connector	Network connection, Internet for ISW
USB port /1 (USB TypeA)	USB ISW, For authentication device (Biometric type: AU-101 or IC card type: AU-201)
USB port /2 (USB TypeA)	
USB port /3 (USB TypeA)	Scan to USB, USB for print
USB port /4 (USB TypeB)	For the local connection when installed EK-703 (Option)
Service port	For the production adjustment This is not used in the field

# 21. IMAGE STABILIZATION CONTROL

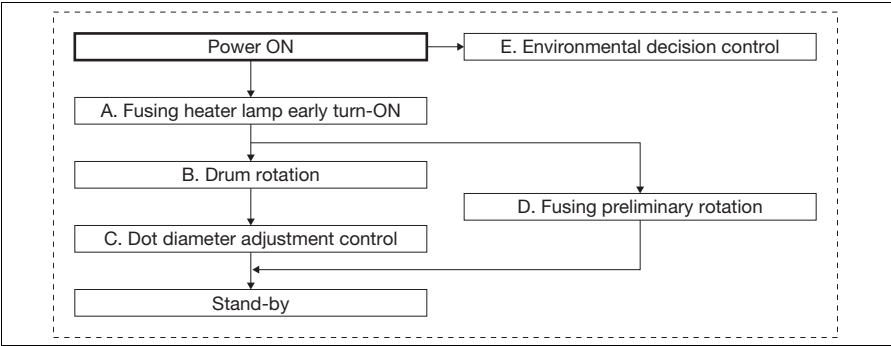
## 21.1 Outline

This machine employs various image stabilization controls to realize the top quality print image at all times. The operation of the image stabilization control varies between while in the power switch (SW2) ON and while in the print.

## 21.2 Operation flow

### 21.2.1 Image stabilization control flow when the power switch (SW2) is turned ON

The following shows the operation flow of the image stabilization control when the SW2 is turned ON.



#### A. Fusing heater lamp early turn-ON

##### (1) Purpose

To meet the warm-up specifications, the fusing heater lamps /1 (L2) and /2 (L3) are turned ON early enough so that the surface temperature of the fusing roller goes up to the prescribed temperature in its early stage.

##### (2) Execution timing

When the power switch (SW2) is turned ON, without waiting for the initialization of the overall control, the fusing heater lamp is turned ON by the signal on the printer control board (PRCB). However, since turning ON the fusing heater lamps /1 (L2) and /2 (L3) at the same time causes an excessive inrush current, turn ON L3 first, and then turn ON L2 a little after that. After turning ON L2 and L3, conduct the ON/OFF control at specified intervals to maintain the prescribed temperature of the fusing roller that is stipulated in each operation mode.



**B. Drum rotation****(1) Purpose**

- Prevent the drum charge leak such as an image flow at high humidity
- When left in the low/normal humidity condition, prevent the uneven density due to the difference in sensitivity between the section facing the cleaner and the developing of the drum and other sections.

**(2) Execution timing**

It turns ON a specified period of time after the power switch (SW2) turns ON, and turns OFF when the dot diameter adjustment is completed. However, when the 30 seconds extension of the early morning drum rotation is selected in the software DipSW setting, it turns OFF 30 seconds after the completion of the dot diameter adjustment.

**Note**

- **For bizhub 421/361, since the early morning dot diameter adjustment is not selected by default, no drum rotation is made.**

**C. Dot diameter adjustment control****(1) Purpose**

Stabilize the image over a long period of time by preventing the change of the laser 1 dot diameter due to the write system being stained or the change of developability.

**(2) Method**

- Create a dot pattern patch of a fixed density on the drum. The laser PWM at this time is maximum.
- Read this dot pattern patch with the IDC sensor (IDCS) and calculate the difference between the sensor output and the specified value.
- Determine the correction amount of the laser power based on a value calculated to make corrections of the laser power.
- Repeat several times the control operations described above.

**(3) Execution timing**

When left for more than 8 hours, executed a specified period of time after the power switch (SW2) is turned ON. However, this can be changed with the software DipSW setting.

**Note**

- **For bizhub 421/361, since the early morning dot diameter adjustment is not selected by default, no execution is made.**

**D. Fusing preliminary rotation****(1) Purpose**

Make uniform the surface temperature of the fusing roller and the fusing pressure roller.

**(2) Execution timing**

When the detected temperature of the thermistors /1 (TH1) and /2 (TH2) gets to the stipulated temperature.

**Note**

- **The stipulated temperature at which the fusing preliminary rotation is made varies for bizhub 501 and 421/361.**

**E. Environmental decision control****(1) Purpose**

To detect the environmental temperature and humidity to maintain the image quality, feedback is made to various controls.

**(2) Method**

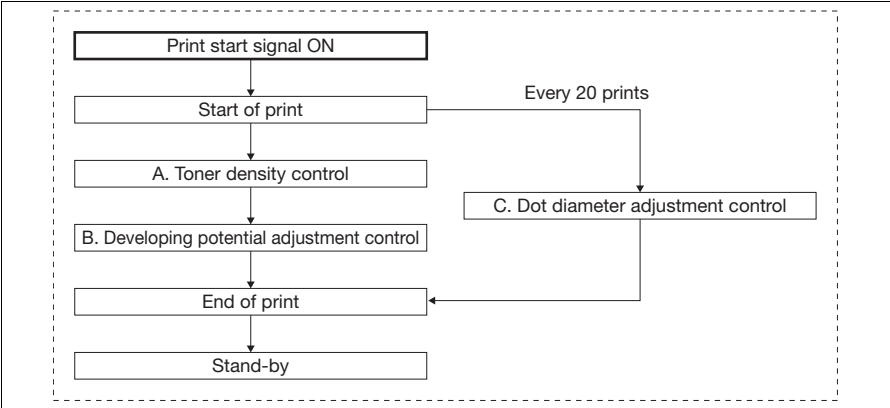
A temperature sensor and a humidity sensor are equipped inside the machine.

**(3) Execution timing**

When the power switch (SW2) is turned ON, and only when it has been left unused for more than 8 hours after the SW2 was turned OFF last time and the fusing temperature is considered below the stipulated temperature, an environmental decision is made based on a value measured by the sensor.

21.2.2 Image stabilization control flow while in the print and the idle

The following shows the image stabilization control flow while in the print and the idle.



A. Toner density control

(1) Method

- Output value obtained through the TCR adjustment which is performed after developer replacement is used as the base.
- Toner density in the developing unit is always detected with the TCR sensor. The detected TCR sensor output value is compared with the base value and if it is lower than the base, toner supply is started.

B. Developing potential adjustment control

(1) Purpose

Because of developer and photosensitive material being deteriorated due to durability, it becomes difficult to secure the stable amount of toner on the photosensitive material. For that reason, calculate the correction amount based on the machine inside temperature and the time period during which the photosensitive material is driven and make corrections of the output values of the charging grid and the developing bias to secure the stable amount of toner.

(2) Method

Detect the machine inside humidity with the humidity sensor (HUMS) when turning ON the power switch (SW2) 8 hours or more after turning it OFF.

Calculate the correction amount based on the machine inside humidity detected and the time period during which the photosensitive material is driven.

Make corrections of the output value of the charging grid and the developing bias based on the correction amount calculated.

When the time period during which SW2 is turned ON after OFF is less than 8 hours, use the value of the machine inside humidity detected last time.

(3) Execution timing

For each job print.

C. Dot diameter adjustment

(1) Purpose

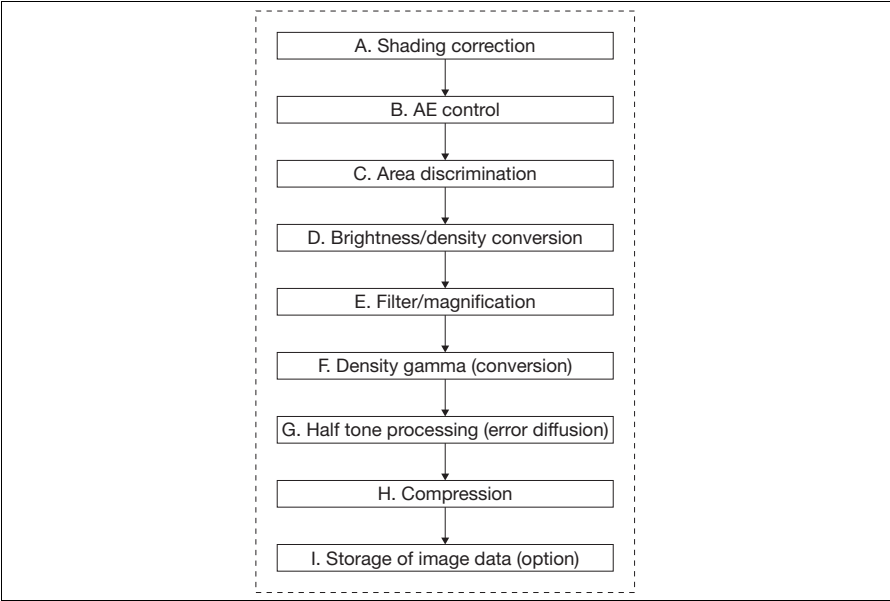
While in the continuous print, reduce the variance in image density for each print.

**(2) Method**

- Create a dot pattern patch between images of which more than 20 prints have been run off. The laser PWM at this time is maximum.
- Read this dot pattern patch with the IDC sensor (IDCS) and calculate the difference between the sensor output and the specified value.
- Determine the correction amount of the laser power based on a value calculated to make corrections of the laser power.
- Repeat several times the control operations described above.

22. IMAGE PROCESSING

22.1 Image processing in the scanner section



**22.1.1 Shading correction**

This is the measure to obtain an even distribution from light of the CCD sensor. The following corrections are made at the prescribed timing.

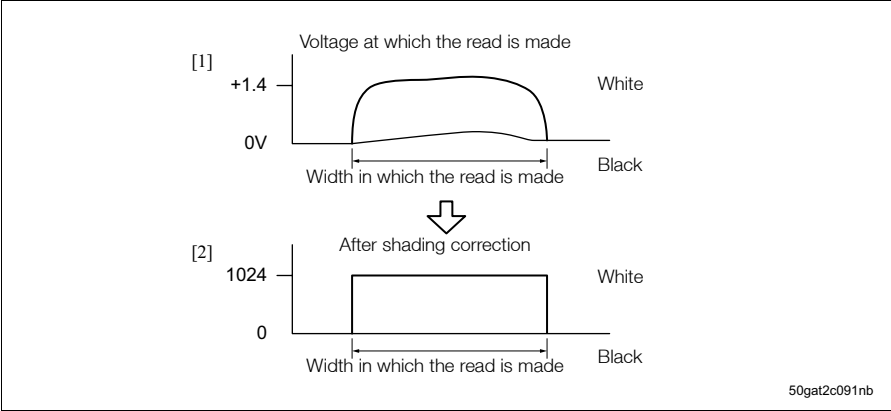
**a. White correction**

The output voltage of each pixel of the CCD sensor when the white reference plate is exposed to the exposure lamp is stored as the maximum output of the pixel.

**b. Black correction**

The output voltage of each pixel of the CCD sensor when the exposure lamp is turned off is stored as the minimum output of the pixel.

Conduct calculation to find out what step in this range falls on the image data read from the original based on the difference between the black and white data for each pixel stored in the steps a. and b. above, and output the results of the calculation in the 10 bits accuracy.



[1] AD conversion input

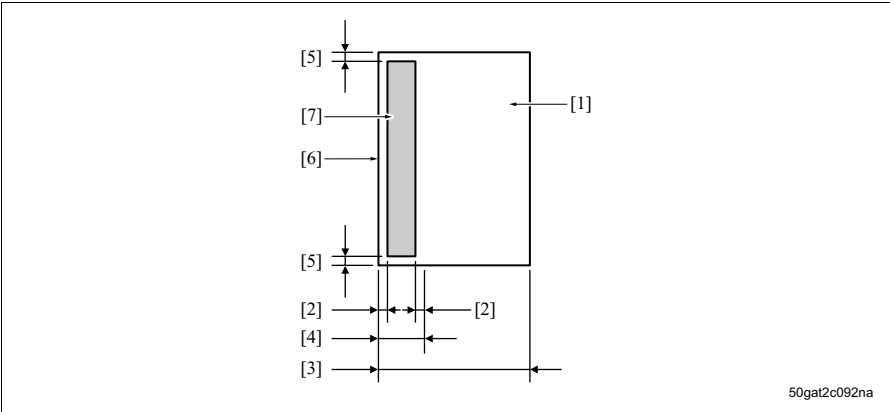
[2] Shading correction output

22.1.2 AE control

Through the AE control, a density suitable for the original density is automatically selected and the copy is made properly.

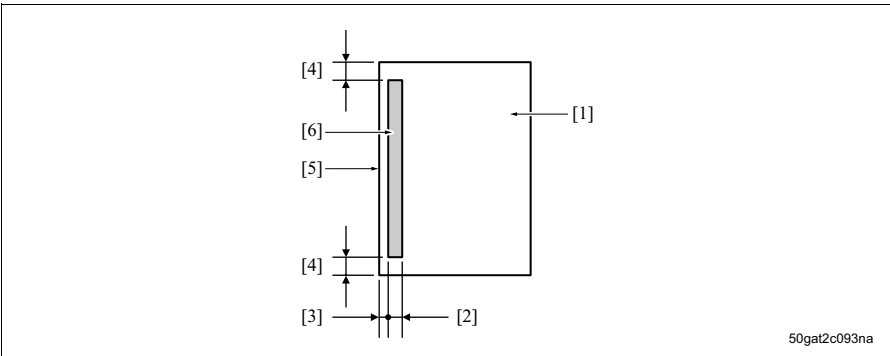
A. Sampling area

(1) While in the platen mode



- |              |                                  |
|--------------|----------------------------------|
| [1] Original | [5] 10 mm                        |
| [2] L/100 mm | [6] Leading edge of the original |
| [3] L mm     | [7] AE sampling range            |
| [4] 30 mm    |                                  |

(2) While in the DF mode



- |              |                                  |
|--------------|----------------------------------|
| [1] Original | [4] 20 mm                        |
| [2] 2.9 mm   | [5] Leading edge of the original |
| [3] 1.5 mm   | [6] AE sampling range            |

B. Execution timing

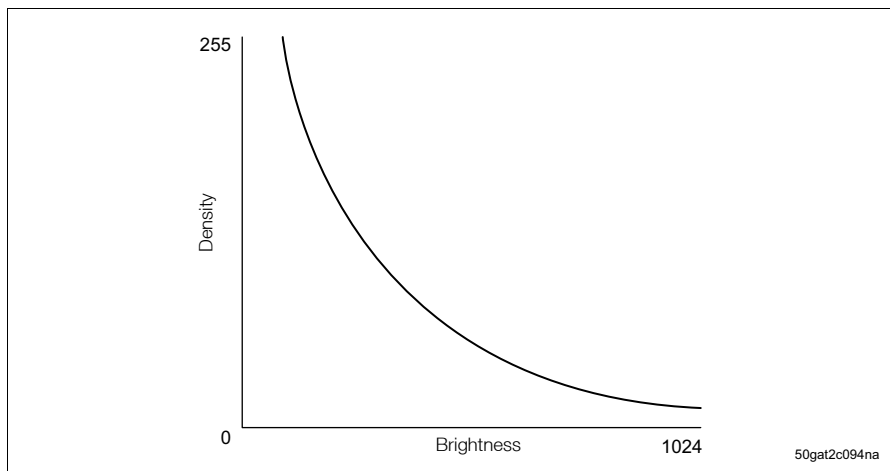
- While in the platen print: At the pre-scan before the actual scan when the print or the read starts.
- While in the DF print : At the same time as when the original is read.

### 22.1.3 Area discrimination

To make a copy of the original under the correct condition (to make a correct filter processing), check the read section to see if it is a character or a dot picture, and use the results at the image processing unit at the later stage.

### 22.1.4 Brightness/density conversion

The signal obtained after the shading correction is a signal corresponding to the light reflected from the original, and this is generally called a brightness signal. In this brightness/density conversion section, the brightness signal is converted in density as shown in the graph below.





22.1.5 Filter/magnification

A. Filter processing

An appropriate filter processing is made according to the type of an original and the magnification selected.

- (1) Character : Make the shading of an original conspicuous.
- (2) Dot section : Suppress moire.
- (3) Picture : Increase the reproducibility of gradation.

B. Magnification processing

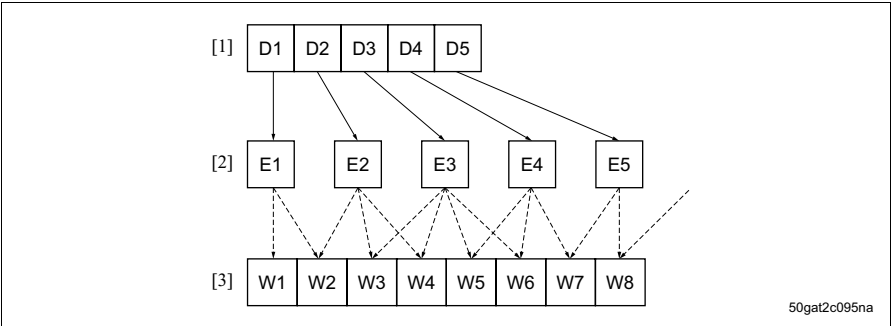
For this machine, the sub scan direction magnification is made by the scan speed of the exposure unit (platen mode) or by the conveyance speed of the DF (DF mode), and the main scan direction magnification is made by processing images electrically.

(1) Main scan magnification processing while in enlargement

As shown in the drawing below, if the data of each pixel obtained when the original is read by the CCD are D1 to D5, the positions of the data read when enlarged are E1 to E5. However, when the write is made only with the data thus read, the following problems occur.

- a. There occurs a clearance between data, and this results in a distorted image.
- b. The data position does not fall in exactly with the write position.

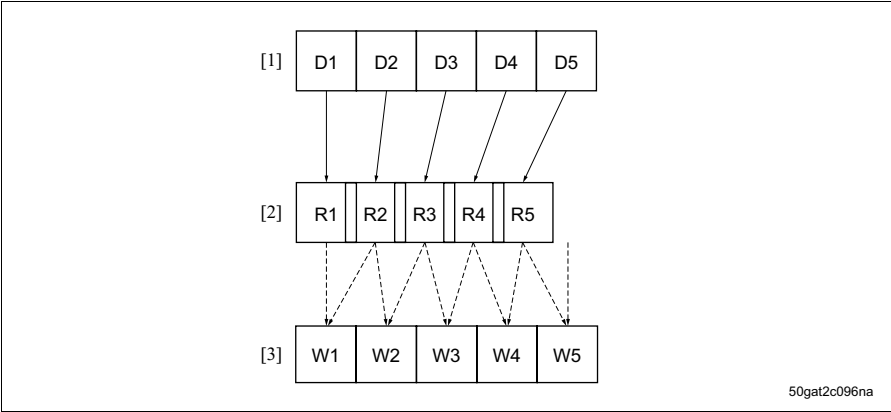
As shown with dotted lines in the drawing below, when there is no read data that corresponds exactly to the write position, a density is decided for the write as shown below and appropriate processing is made.



- [1] Position at which the original is read
- [2] Data position while in enlargement
- [3] Write position

**(2) Main scan magnification processing while in reduction**

As shown in drawing below, if the data of each pixel obtained when the original is read by the CCD are D1 to D5, the positions of the data read when reduced are R1 to R5. They are overlapping each other and do not correspond to the write position. Therefore, a density is decided for the write as shown below and an appropriate processing is made.

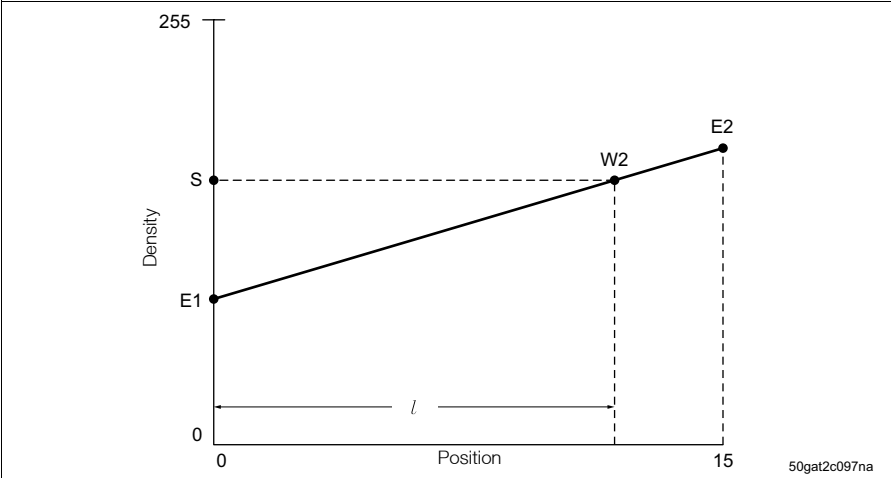


- [1] Position at which the original is read                      [3] Write position  
[2] Data position while in reduction

**(3) Density adjustment**

With the density (256 gradation) shown in the axis of coordinate and the position shown in the axis of abscissas, when E2-E1 in the drawing of "(1) Main scan magnification processing while in enlargement" is shown in 16 steps in the direction of the axis of abscissas, the following drawing is obtained. When the position to the written data W2 is "l," the density S can be obtained in the following expression.

$$S = E1 + \{(E2 - E1) / 16\} \times l$$



**22.1.6 Scanner gamma correction**

To the data obtained after the filter/magnification processing, select a density curve corresponding to the density button selected on the operation panel. An appropriate density curve is provided for each of the character/picture/character and the picture/thin character modes.

**22.1.7 Halftone processing (error diffusion)**

To make effective use of the installed memory and obtain an excellent copy image, error diffusion processing is employed, which is one of the pseudo-intermediate processing methods.

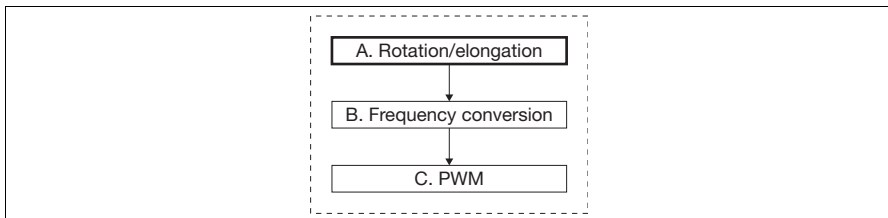
**22.1.8 Compression**

To store more image data, data is stored temporarily in the image memory after the images has been compressed.

**22.1.9 Storage of image data**

The image/setting of the originals read by the scanner or the images sent from the IC can be stored as a file in the hard disk in the main body. (option)

## 22.2 Image processing in the write section



### A. Rotation/elongation

Rotate the image in the direction of 90 degrees and 180 degrees as necessary.

When outputting images from the memory, expand the compressed data to restore them to their original state.

### B. Frequency conversion

Write in the memory once the data after the PWM conversion and read it in accord with the write clock signal of the printer.

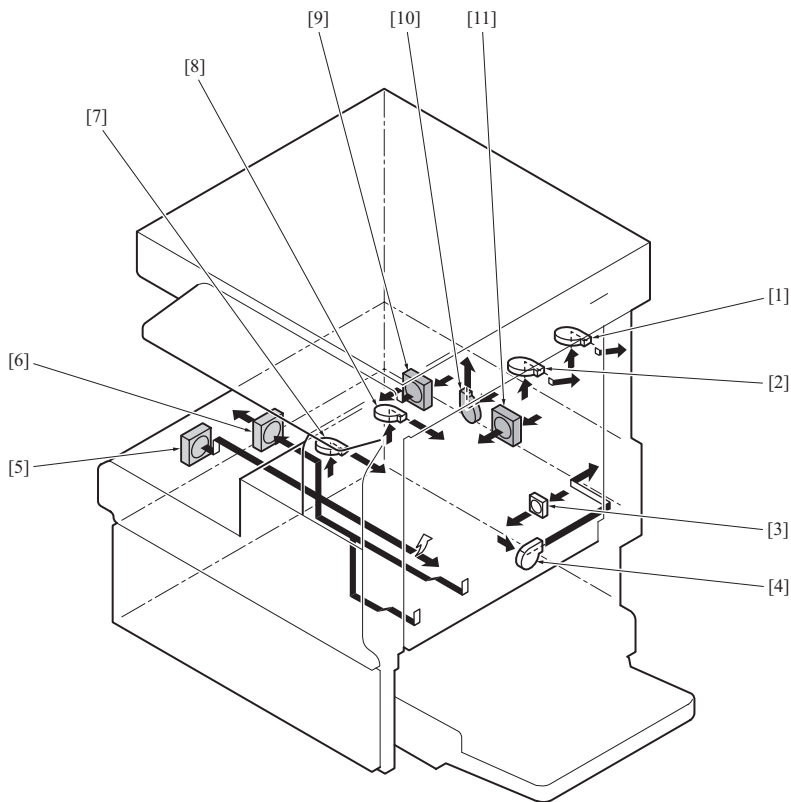
### C. PWM

The period of time the laser is turned ON is changed by changing the pulse width.

## 23. OTHERS

### 23.1 Fan control

#### 23.1.1 Composition



50gat2c029nb

- |                                  |   |
|----------------------------------|---|
| [1] Exhaust fan /Rr (FM9)        | [7] Fusing cooling fan /Fr (FM2)              |
| [2] Exhaust fan /Fr (FM3)        | [8] Fusing cooling fan /Rr (FM8)              |
| [3] CPU cooling fan (FM11)       | [9] Power supply cooling fan (FM1)            |
| [4] Conveyance suction fan (FM5) | [10] Overall control board cooling fan (FM10) |
| [5] Drum cooling fan (FM4)       | [11] Developing cooling fan (FM7)             |
| [6] Developing suction fan (FM6) |   |

### 23.1.2 Operation

#### A. Power supply cooling fan (FM1) control

##### (1) Purpose

Cool down the DC power supply (DCPS) and the high voltage unit (HV2) with suction air.

##### (2) ON timing

- It turns ON a specified period of time after the drum motor (M1) turns ON.
- While in the auto toner supply mode and the TCR adjustment mode, it turns ON in synch with the turn-ON of M1.
- While in the low power mode and the stand-by condition, it turns ON in synch with the turn-ON of the drum cooling fan (FM4).

##### (3) OFF timing

- While in the initial charging mode, the auto toner supply mode and the TCR adjustment mode, it turns OFF in synch with the turn-OFF of the drum motor (M1).
- In cases other than the above, it turns OFF a specified period of time after M1 turns OFF.
- While in the low power mode and the stand-by condition, it turns OFF in synch with the turn-OFF of FM4.

#### B. Fusing cooling fan /Fr (FM2) and /Rr (FM8) control

##### (1) Purpose

- While in the continuous print of small size paper (paper width: 200 mm or less), cool down both edges of the fusing roller to suppress a temperature rise on the section of the fusing roller through which no paper passes.
- Suppress a temperature rise when printing large size paper (paper width: 201 mm or more).
- Suppress a fusing overshoot caused by an emergency stop when a jam occurs.

##### (2) ON timing

- While in the print of small size paper, they turn ON when the fusing exit sensor detects the first job paper.
- While in the print of large size paper, they turn ON when the thermistor /2 (TH2) goes over the prescribed temperature.
- They turn ON when the print operation is stopped by a jam.

##### (3) OFF timing

- While in the print of small size paper, they turn OFF in synch with the turn-OFF of the fusing motor (M11).
- While in the print of large size paper, they turn OFF when TH2 detects a temperature lower than the prescribed temperature.
- They turn OFF a specified period of time after it turns ON by a jam.

#### C. Exhaust fan /Fr (FM3) and /Rr (FM9) control

##### (1) Purpose

With exhaust air, cool down paper conveyed and remove heat around the reverse section in the machine.

##### (2) ON timing

- They turn ON in synch with the turn-ON of the drum motor (M1).

##### (3) OFF timing

- While in the initial charging mode and the TCR adjustment mode, they turn OFF in synch with the turn-OFF of M1.
- In cases other than the above, they turn OFF a specified period of time after the turn-OFF of M1.

**D. Drum cooling fan (FM4) control****(1) Purpose**

Cool around the drum and the toner bottle with suction air.

**(2) ON timing**

- After completion of the print, it turns ON a specified period of time after the drum motor (M1) turns OFF.
- It turns ON when the machine inside temperature goes over the prescribed temperature.

**(3) OFF timing**

- It turns OFF a specified period of time after it turns ON after completion of the print.
- While it turns ON after completion of the print, it turns OFF the moment M1 turns ON.
- It turns OFF when the machine inside temperature goes down below the prescribed temperature.

**E. Conveyance suction fan (FM5) control****(1) Purpose**

Exhaust by sucking air around the conveyance path between the drum and the fusing unit, and stabilize the conveyability of paper and remove exhaust heat and ozone at the same time.

**(2) ON timing**

- It turns ON in synch with the turn-ON of the drum motor (M1).
- While in the low power mode and the stand-by condition, it turns ON in synch with the turn-ON of the drum cooling fan (FM4).

**(3) OFF timing**

- While in the initial charging and the TCR adjustment mode, it turns OFF in synch with the turn-OFF of M1.
- In cases other than the above, it turns OFF a specified period of time after M1 turns OFF.
- While in the low power mode and the stand-by condition, it turns OFF in synch with the turn-OFF of FM4.

**F. Developing suction fan (FM6) control****(1) Purpose**

Suck air from the underside of the developing unit to prevent the splash of toner and exhaust air.

**(2) ON timing**

- It turns ON in synch with the turn-ON of the developing motor (M3).

**(3) OFF timing**

- It turns OFF a specified period of time after M3 turns OFF.
- While in the TCR adjustment mode, it turns OFF in synch with the turn-OFF of M3.

**G. Developing cooling fan (FM7)****(1) Purpose**

Take in fresh air to cool down the developing motor (M3).

**(2) ON timing**

- After completion of the print, it turns ON a specified period of time after M3 turns OFF.
- While in the auto toner supply mode, it turns ON in synch with the turn-ON of M3.
- It turns ON when the machine inside temperature goes over the prescribed temperature.

**(3) OFF timing**

- After completion of the print, it turns OFF a specified period of time after it turns ON.
- While in the auto toner supply mode, it turns OFF in synch with the turn-OFF of M3.
- It turns OFF when the machine temperature goes down below the prescribed temperature.

**H. Overall control board cooling fan (FM10) control****(1) Purpose**

Cool down the overall control board (OACB) with suction air.

**(2) ON timing**

- It turns ON when the power switch (SW2) turns ON.

**(3) OFF timing**

- It turns OFF when SW2 turns OFF.

**I. CPU cooling fan (FM11)****(1) Purpose**

Blow fresh air on the heat sink and cool down CPU.

**(2) ON timing**

- It turns ON in synch with the turn-ON of the main power switch (SW1).

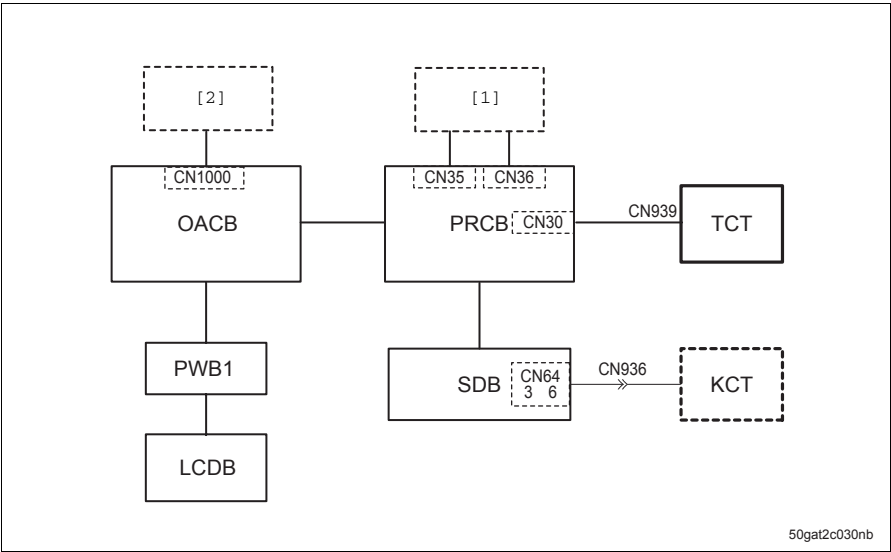
**(3) OFF timing**

- Setting HDD, FAX and the network : Does not turn OFF.
- Not Setting HDD, FAX and the network : Turns OFF only while the sleep mode.



23.2 Counter control

23.2.1 Composition



[1] Coin vendor /2

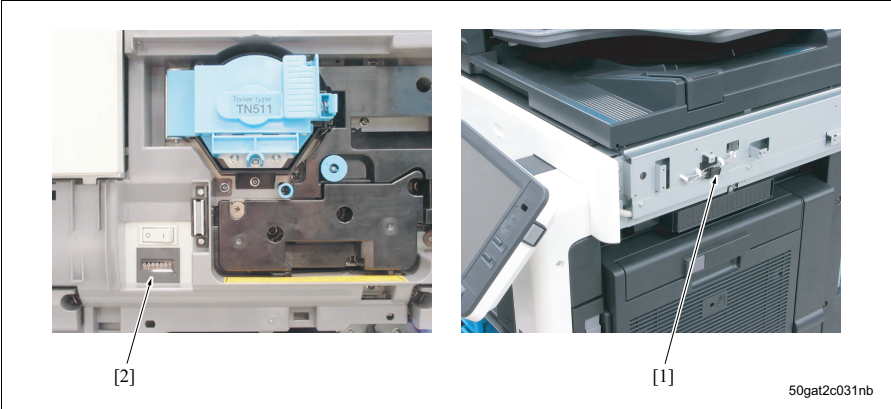
[2] Copy Vender

23.2.2 Operation

A. Paper exit counter

Item	Specifications/mechanism
Total counter (TCT)	<ul style="list-style-type: none"><li>• Display accumulated number of prints in all print modes.</li><li>• Counts up by a paper exit signal.</li></ul>
Electronic counter	<ul style="list-style-type: none"><li>• Display accumulated number of prints on the touch panel.</li><li>• Data collection *1</li><li>• Counts up by a paper exit signal.</li></ul>
Key counter (KCT), optional	<ul style="list-style-type: none"><li>• Counting the designated number of prints allows no further copy operation (can be removed).</li></ul>

\*1 For data collected, See "10.6 Counter" in Field service bizhub 501/421/361 Main body. (See P.199)



[1] CN936 (KCT connecting connector)

[2] Total counter (TCT)

B. Coin vendor/2 (Parallel)

The following shows the specifications of the connecting connector.

Connector	Pin No.	Signal name	Description	Output timing	Type of signal
36	1	M1 signal	Output from the start key being turned ON up to the completion of paper exit	L output while in the print operation	Open collector output
	2	Paper feed signal	Output each time paper is supplied	L output each time paper is supplied from each tray	
	3	Paper size signal (0)	Signal output by paper sizes *1	When the paper size is changed	
	4	Paper size signal (1)			
	5	Paper size signal (2)			
	6	Paper size signal (3)			
	7	Double sided print selection signal	Signal output while in the double sided print	While in the selection of the double sided print	
	8	CPF signal (0)	Signal output by CPF modes	While in the selection of the CPF mode	
	9	CPF signal (1)			
	10	P.GND	Ground	—	—

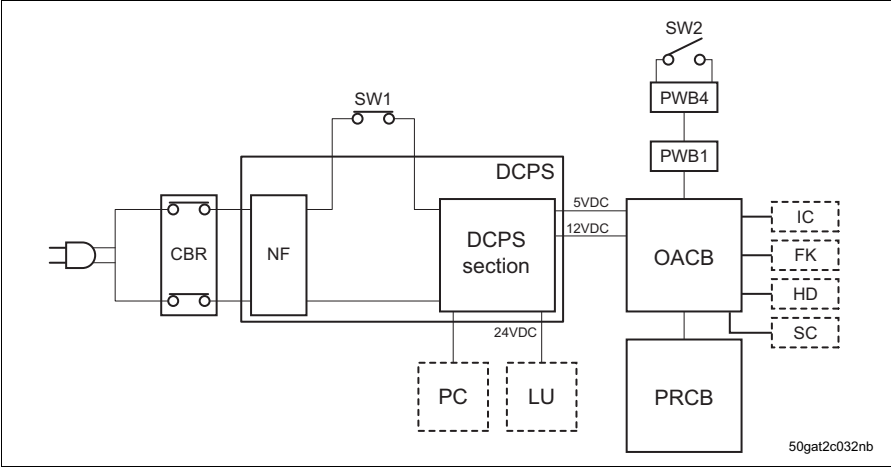
\*1    Output signals by paper sizes

Size	Paper size signal			
	(3)	(2)	(1)	(0)
A3	L	L	H	L
B4	L	L	L	L
A4	L	H	H	L
A4S	H	L	H	L
B5	L	H	L	L
B5S	H	L	L	L
Special	L	H	L	H
11 x 17	L	L	H	H
8½ x 14	L	L	L	H
8½ x 11	L	H	H	H
8½ x 11S	H	L	H	H
5½ x 8½ / A5	L	L	H	L
8 x 13, 8½ x 13¼, 8¼ x 13, 8½ x 13	H	L	L	H

## 23.3 Parts that operate when the power switch is turned ON

### 23.3.1 Parts that operate when the main power switch (SW1) is turned ON

#### A. Composition



#### B. Operation

Turning ON the main power switch (SW1) supplies an AC power source to DC power supply (DCPS).

In this way, each power source of 12V DC and 5V DC is supplied to the overall control board (OACB).

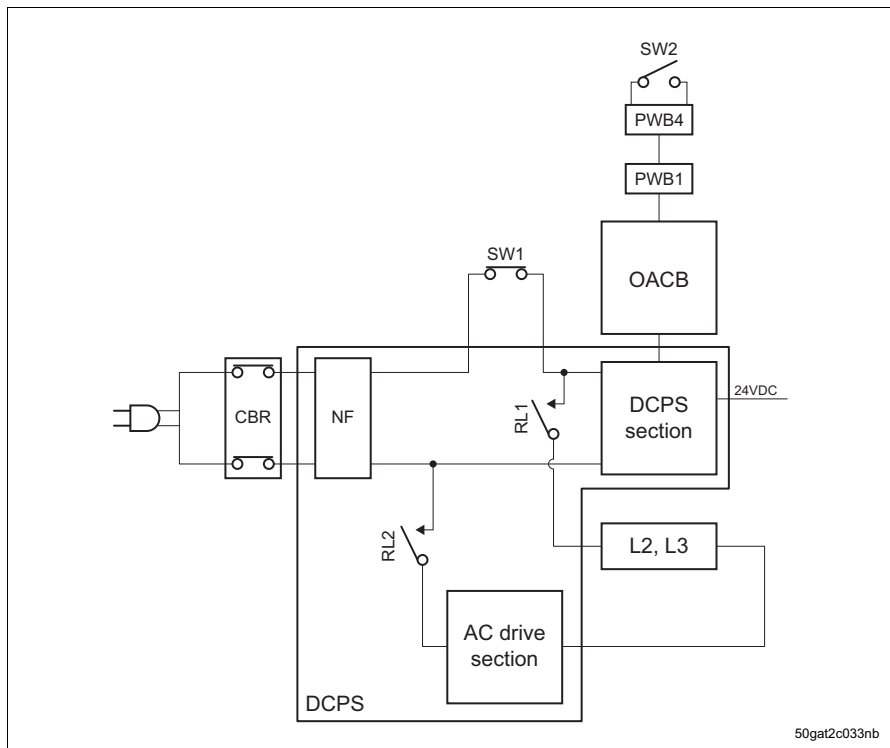


OACB supplies 12V DC and 5V DC to the operation board /1 (PWB1) to be placed in the condition of standing by for the turn-ON of the power switch (SW2).

When equipped optionally with the FAX kit (FK-502) and the hard disk (HD-509), each power source of 12V DC and 5V DC (FK-502) and 5V DC (HD509) is supplied through OACB.

### 23.3.2 Parts that operate when the power switch (SW2) is turned ON

#### A. Composition



#### B. Operation

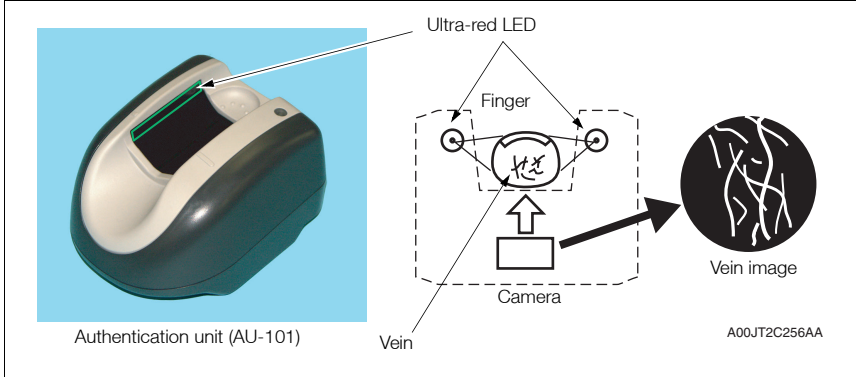
Turning ON the power switch (SW2) transmits an ON signal of SW2 to the overall control board (OACB) through the operation board /1 (PWB1). In this way, OACB sends out a control signal to the DC power supply (DCPS) and DCPS supplies each power source of 12V DC and 5V DC to all boards and optional devices, including the printer control board (PRCB).

After that, OACB sends out to DCPS a control signal that generates a 24V DC power source, which is supplied to all drive boards and optional devices. And when the main relay (RL1) and the sub relay (RL2) turn ON, an AC power source is supplied to the fusing heater lamps /1 (L2) and /2 (L3) to start the initial operation of this machine.

## 23.4 Authentication unit

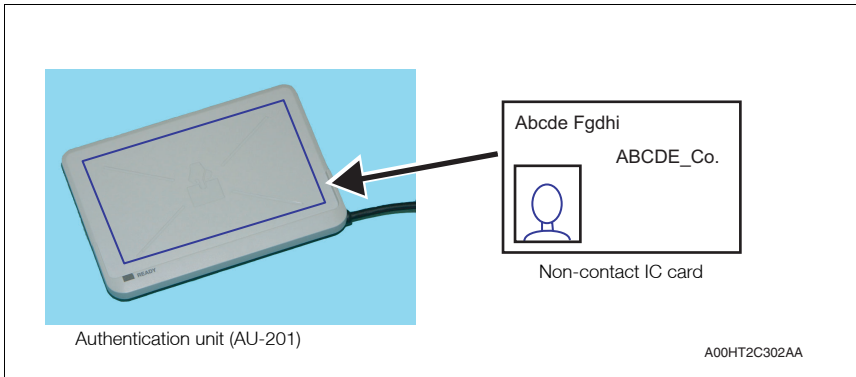
### 23.4.1 Authentication unit (Biometric type) (AU-101)

- A finger vein pattern is used for personal identification.
- Vein patterns are inside the body and cannot be visually recognized. This makes vein patterns extremely difficult to forge or falsify. The vein pattern authentication system can provide high security.
- With ultra-red LED radiation, a finger vein pattern is captured by camera and its image is created. The vein pattern image is registered and a person can be identified if the person's vein pattern matches the registered one at the time of user authentication.



### 23.4.2 Authentication unit (IC card type: AU-201)

- A non-contact IC card, such as an employee ID card, is used for personal identification.
- The system supports the communications protocol in compliance with Type A, Type B, and Felica (Type C) of ISO14443.
- Only Felica and Type A cards can be used for bizhub 501/421/361 machines.
- Simply placing the IC card on the authentication unit will let the unit read the data from the card.



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KONICA MINOLTA

## SERVICE MANUAL

Theory of Operation
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# DF-613







# Revision history

After publication of this service manual, the parts and mechanism may be subject to change for improvement of their performance.  
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The revision marks for Ver. 2.0 are left as they are.

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■ OUTLINE

1. PRODUCT SPECIFICATIONS

A. Type

Name	Reverse Automatic Document Feeder	
Type	Paper Feed	Paper Feed from top of stack
	Turnover	Switch back system
	Paper Exit	Straight exit system
Installation	Screw clamp to the main unit	
Document Alignment	Center	
Document Loading	Left image side up	

B. Functions

Modes	1-Sided Mode / 2-Sided Mode
-------	-----------------------------

C. Paper type

Type of Document	Standard Mode Plain Paper	1-Sided Mode 35 to 128 g/m <sup>2</sup> (9.25 to 34 lbs)
		2-Sided Mode 50 to 128 g/m <sup>2</sup> (13.25 to 34 lbs)
	Mixed Original Detection Mode Plain Paper	1-Sided / 2-Sided Mode 50 to 128 g/m <sup>2</sup> (13.25 to 34 lbs)
	FAX Mode Plain Paper	1-Sided Mode 35 to 128 g/m <sup>2</sup> (9.25 to 34 lbs)
		2-Sided Mode 50 to 128 g/m <sup>2</sup> (13.25 to 34 lbs)
Detectable Document Size*1	Inch area A3, A4S, A4, B4, B5S, B5 11 x 17, 8½ x 14, 8½ x 11S, 8½ x 11, 8½ x 5½S, 8½ x 5½ Metric area A3, A4S, A4, A5S, A5, B4, B5S, B5, B6S 11 x 17, 8½ x 11S, 8½ x 11	
Capacity	80 sheets (80 g/m <sup>2</sup> and load height of 11 mm or less)	

\*1: For the Combined Original Detection Mode, Refer to the Mixed Original Detection Enabled Size Combination Table.

**D. Paper feed prohibited originals**

- If fed, trouble occurrence will be highly possible.

Type of Original	Possible Trouble
Original that is stapled or clipped.	Feed failure, damage to the original, or drive failure due to clip clogging
Book original	Feed failure, damage to the original, or drive failure
Original weighing less than 35g/m <sup>2</sup> or 128g/m <sup>2</sup> or more	Feed failure
Torn original	Feed failure, damaged sheet
Highly curled original (15 mm or more)	Original misfeed due to dog-ear or skew
OHP transparencies	Feed failure
Label Sheet	Feed failure
Offset master	Feed failure
Sheets clipped or notched	Damaged sheet
Sheets patched	Patched part folded or torn sheet

**E. Paper feed not guaranteed originals**

- If fed, paper feed will be possible to some extent but trouble occurrence will be possible.

Type of Original	Possible Trouble
Sheets lightly curled (Curled amount: 10 - 15 mm)	Dog-eared, exit failure
Heat Sensitive Paper	Edge folded, exit failure, conveyance failure
Coated Paper (Ink Jet Paper)	Take-up failure, conveyance failure
Translucent paper	Take-up failure, conveyance failure
Paper immediately after paper exit from the main unit	Take-up failure, conveyance failure
Paper with many punched holes (e.g., loose leaf) limited to vertical feeding	Multi-page feed due to flashes from holes
Sheets with 2 to 4 holes	Conveyance failure
Sheets two-folded or Z-folded (amount of non-flatness: 15 mm or less)	Take-up failure, conveyance failure, image deformation
Sheets folded	Image deformation, multi-page feed, take-up failure

F. Mixed original feed chart

For Metric

		Reference original (original with a maximum width)							
		A3	A4	B4S	B5	A4S	A5	B5S	A5
Other originals	A3	△	○	—	—	—	—	—	—
	A4	○	△	—	—	—	—	—	—
	B4S	⊙	⊙	△	○	—	—	—	—
	B5	⊙	⊙	○	△	—	—	—	—
	A4S	⊙	⊙	⊙	⊙	△	○	—	—
	A5	⊙	⊙	⊙	⊙	○	△	—	—
	B5S	X	X	⊙	⊙	⊙	⊙	△	—
	A5S	X	X	X	X	X	X	X	△

△: Same size   ○: Same group   ⊙: Different group   X: Mix prohibited   —: No need to set

For Inch

		Reference original (original with a maximum width)					
		11 x 17	8½ x 11	8½ x 14	8½ x 11S	5½ x 8½	5½ x 8½ S
Other originals	11 x 17	△	○	—	—	—	—
	8½ x 11	○	△	—	—	—	—
	8½ x 14	⊙	⊙	△	○	○	—
	8½ x 11S	⊙	⊙	○	△	○	—
	5½ x 8½	⊙	⊙	○	○	△	—
	5½ x 8½S	X	X	X	X	X	△

△: Same size   ○: Same group   ⊙: Different group   X: Mix prohibited   —: No need to set

G. Maintenance

Maintenance	Same as the main body.
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H. Machine data

Power Requirements	24V DC ± 10% (supplied from the main body)
Max. Power Consumption	48 W or less
Dimensions	582 (W) x 558 (D) x 145 mm (H)
Weight	Approx. 10 kg

I. Operating environment

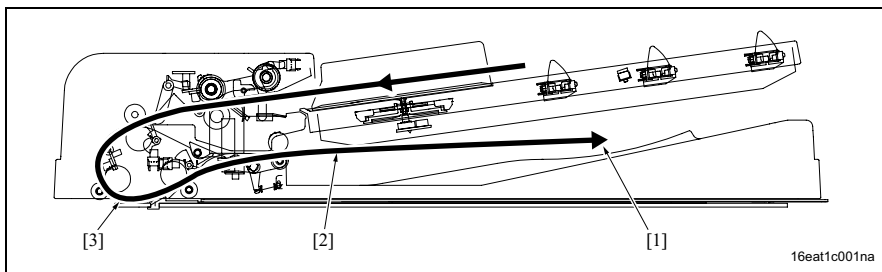
Temperature	10 to 30°C
Humidity	10 to 80% RH (with no condensation)

NOTE

- These specifications are subject to change without notice.

## 2. PAPER PATH

### 2.1 In 1-sided mode

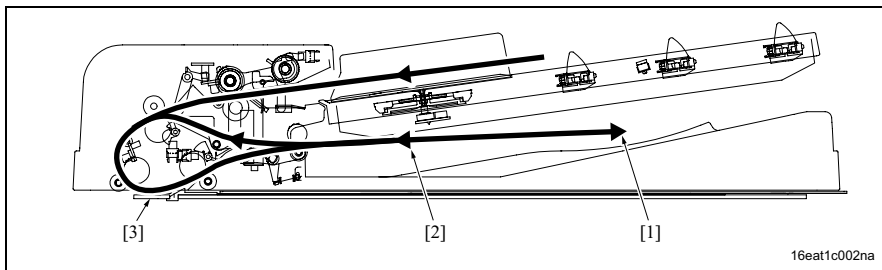


[1] Exit

[3] Feed (Scanning the 1st side)

[2] Conveyance and turnover

### 2.2 In 2-sided mode



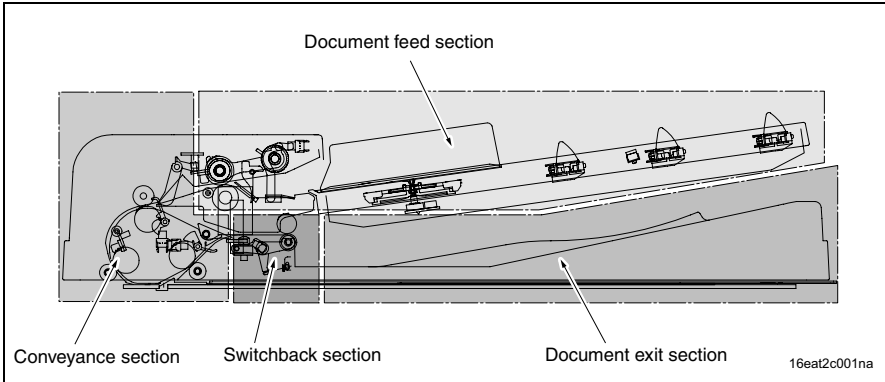
[1] Exit

[3] Feed (Scanning the 1st side)  
 Conveyance and turnover (Scanning the 2nd side)  
 Conveyance

[2] Conveyance and switchback

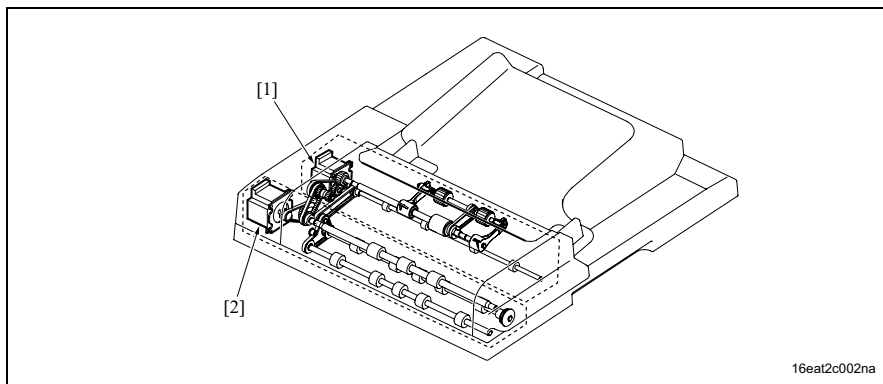
## ■ COMPOSITION/OPERATION

### 3. COMPOSITION





## 4. DRIVE



[1] Original Feed Motor (M1)

[2] Original Conveyance Motor (M2)

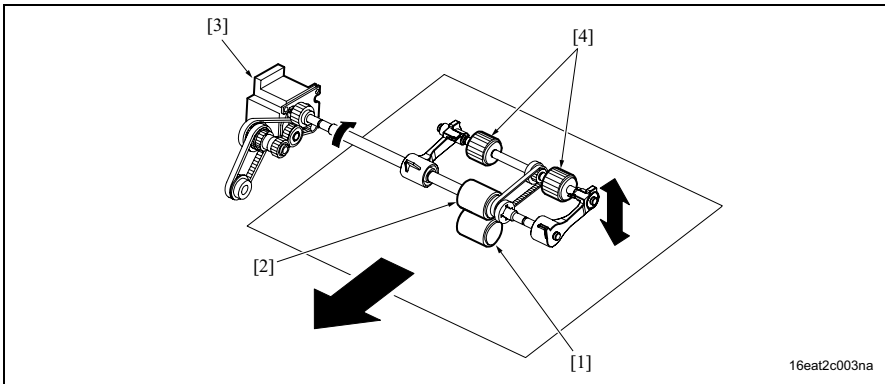
## 5. OPERATION

### 5.1 Document pick-up mechanism

- The Document Pick-Up Section consists of the Pick-Up Rollers, Feed Roller and Separation Roller, and this section is driven by the Original Feed Motor (M1).

#### 5.1.1 Pick-up operation

- When the Start key is pressed, the Original Feed Motor (M1) [3] starts rotating backward, causing the Pick-Up Roller [4] to lower and start rotating at the same time. At the same time, the Feed Roller [2] starts rotating.
- The Pick-Up Rollers are in the raised position when in the standby state and in the lowered position during feeding.



[1] Separation Roller

[2] Feed Roller

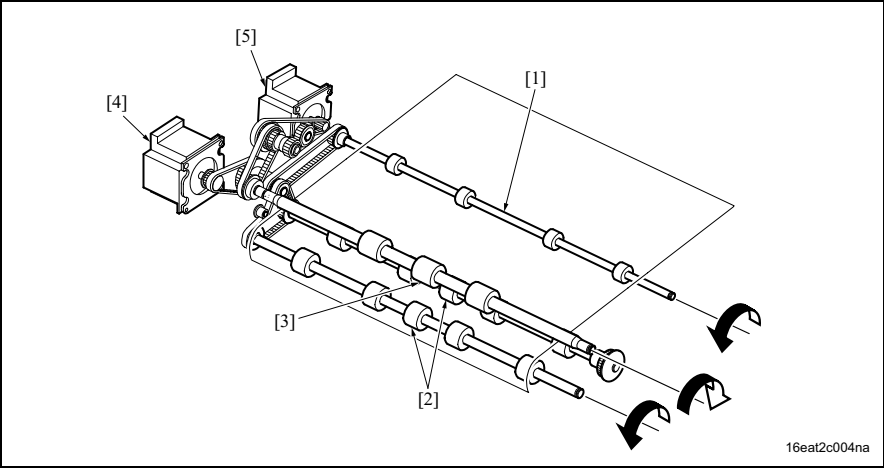
[3] Original Feed Motor (M1)

[4] Pick-Up Roller

5.2 Document feed/conveyance mechanism

- When the original reaches the Registration Sensor, the Original Feed Motor (M1) [5] starts rotating forward and, at the same time that the Pickup Roller goes up, drive is then supplied to the Registration Roller [3].
- When the Original Conveyance Motor (M2) [4] starts rotating forward, the two Conveyance Rollers [2] and the Exit/Turnover Roller [1] feed the document toward the exit direction.

Parts	Direction of Rotation	Details
M1	Backward rotation	The Pickup Rollers lower and start rotating and the Feed Roller rotates.
	Forward rotation	The Registration Roller rotates.
M2	Backward rotation	The Conveyance Roller and Exit/Turnover Roller rotate in the direction to turn over the original.
	Forward rotation	The Conveyance Roller and Exit/Turnover Roller rotate in the direction to feed the original out.

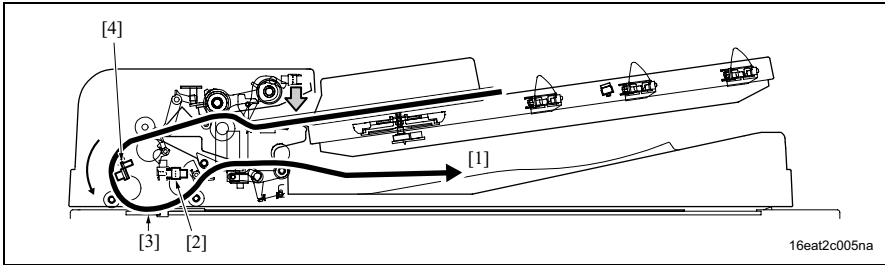


- [1] Exit/Turnover Roller

[2] Conveyance Roller

[3] Registration Roller
- [4] Original Conveyance Motor (M2)

[5] Original Feed Motor (M1)

**A. Operation flow in the 1-sided mode**

[1] Exit

[3] Scanning the 1st side

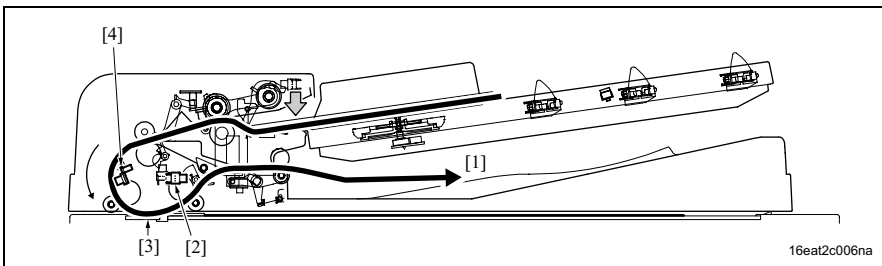
[2] Original Exit Sensor (PS10)

[4] Original Detection Sensor (PS8)

1. When the Start key is pressed, the Original Feed Motor (M1) starts rotating backward, causing the Pick-Up Roller to lower and start a paper take-up sequence.
2. A specified period of time after the leading edge of the original turns ON PS8 [4], the scanning of the 1st side of the original starts.
3. The original is conveyed for a given period of time after the trailing edge of the last page of the document has deactivated the PS10 [2]. It is then fed into [1] the Exit Tray and the Original Conveyance Motor (M2) is deenergized.

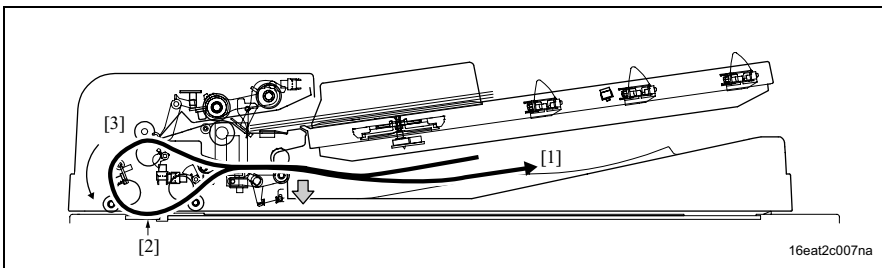
**B. Operation flow in the 2-sided mode**

1. When the Start key is pressed, the Original Feed Motor (M1) starts turning backward, causing the Pick-Up Roller to lower and start feeding the 1st page of the document. A specified period of time after the leading edge of the original turns ON the Original Detection Sensor (PS8) [4], the scanning of the 1st side of the original starts. The Original Conveyance Motor (M2) is deenergized to stop [1] the original after the lapse of a given period of time after the trailing edge of the 1st page has deactivated the Original Exit Sensor (PS10) [2].



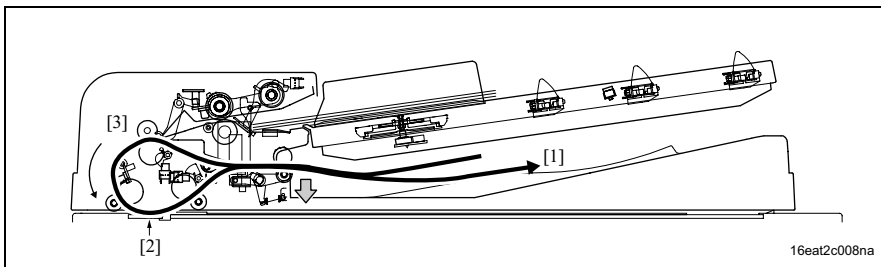
- |                                 |                                     |
|---------------------------------|-------------------------------------|
| [1] Stop                        | [3] Scanning the 1st side           |
| [2] Original Exit Sensor (PS10) | [4] Original Detection Sensor (PS8) |

2. M2 is turned backward to turn over [3] the original. After the Registration Roller, M2 is turned forward to allow the Scanner to scan the backside of the 1st page.
3. After the conveyance sequence for turnover has been started, the Pressure Roller Release Solenoid (SD1) is energized so that the Exit/Turnover Roller is retracted.



- |                           |              |
|---------------------------|--------------|
| [1] Stop                  | [3] Turnover |
| [2] Scanning the 2nd side |              |

4. To ensure that pages of the document are in the proper order, the page is turned over [3] again before being ejected [1] into the Exit Tray.



[1] Exit

[3] Turnover

[2] Scanning the 2nd side

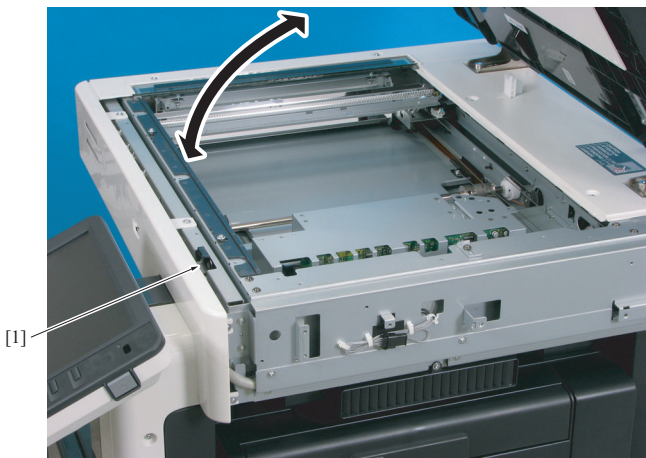
## 5.3 Raised/lowered position detecting mechanism

### 5.3.1 DF 15° open/close detection mechanism

- When DF is closed down to about 15° or less, the Original Cover Angle Detection Lever of the main body is pressed down to turn ON the APS Timing Sensor (PS31).

### 5.3.2 DF open/close detection mechanism

- A magnet is provided so that the open/close of DF can be detected on the main body side.
- When DF is closed, the DF Open/Close Switch (SW3) of the main body is turned ON by the magnet.



a0ret2c001ca

[1] DF Open/Close Switch (SW3)



KONICA MINOLTA

## SERVICE MANUAL

Theory of Operation
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# PC-206

## (bizhub 501/421/361)







# Revision history

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## ■ OUTLINE

### 1. PRODUCT SPECIFICATIONS

#### A. Type

Name	2 way Paper Take-Up Cabinet
Type	Front loading type 2 way paper take-up device
Installation	Desk type
Document Alignment	Center

#### B. Paper type

Paper Type	Same as the main body.	
Paper Size	Metric: A3, B4, A4, A4S, B5, A5S, 11 × 17, 8½ × 11, 8½ × 11S, Foolscap, 8K *1, 16K *1 Inch: 11 × 17, 8½ × 14, 8½ × 11, 8½ × 11S, 5½ × 8½S, A3, A4, A4S, Foolscap	
Capacity	Tray 3	500 sheets (80 g/m <sup>2</sup> )
	Tray 4	500 sheets (80 g/m <sup>2</sup> )

\*1: Only supported in Taiwan.

#### C. Maintenance

Maintenance	Same as the main body.
-------------	------------------------

#### D. Machine specifications

Power Requirements	24V DC ± 10 %, 5V DC ± 5 % (supplied from the main body)
Power Consumption	15 W or less
Dimensions	570 mm (W) × 577 mm (D) × 300 mm (H)
Weight	Approx. 26.0 kg

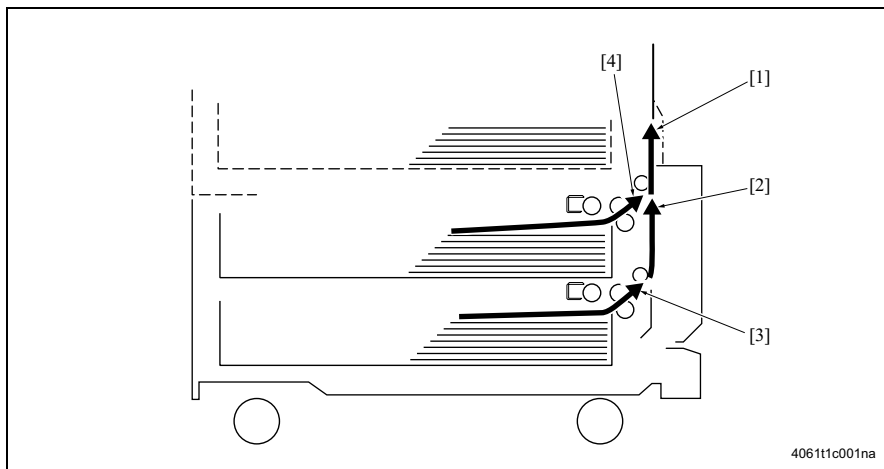
#### E. Operating environment

Temperature	Same as the main body.
Humidity	Same as the main body.

#### NOTE

- The information herein may be subject to change for improvement without notice.

## 2. PAPER PATH



[1] Convey to the main body

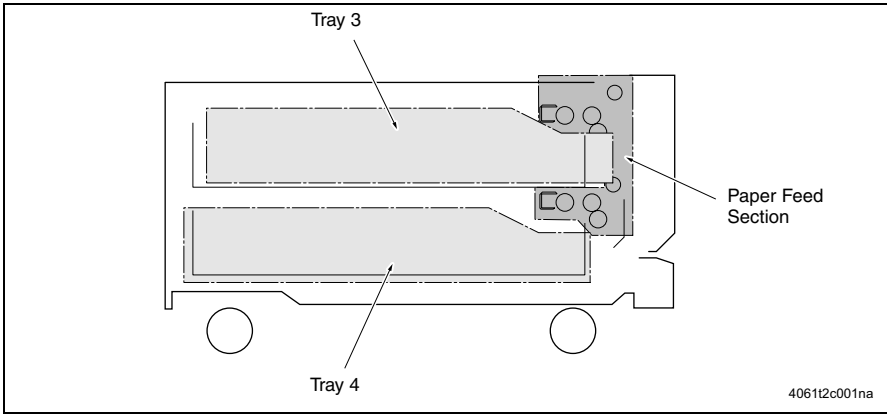
[2] Vertical conveyance through PC

[3] Tray 4 paper feed

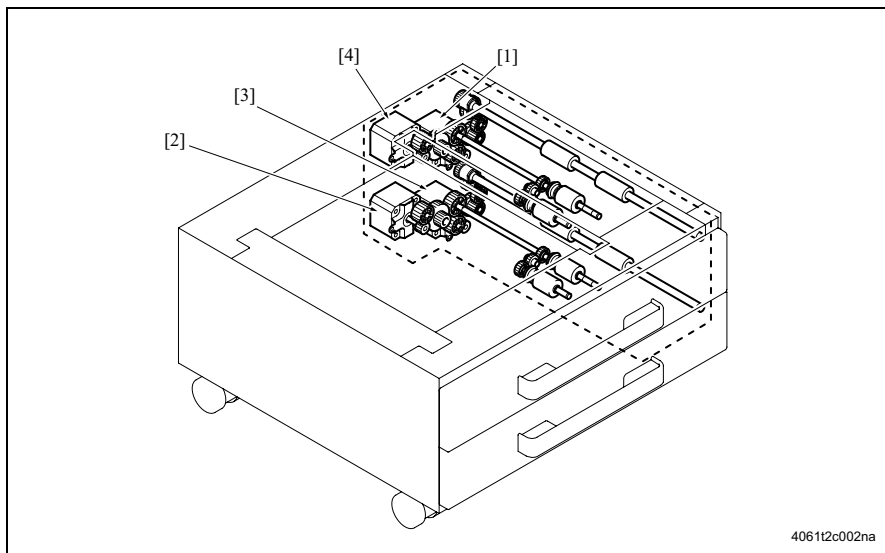
[4] Tray 3 paper feed

## ■ COMPOSITION/OPERATION

### 3. COMPOSITION



## 4. DRIVE



[1] Vertical Conveyance Motor /3 (M120)

[2] Paper Feed Motor /4 (M123)

[3] Vertical Conveyance Motor /4 (M121)

[4] Paper Feed Motor /3 (M122)

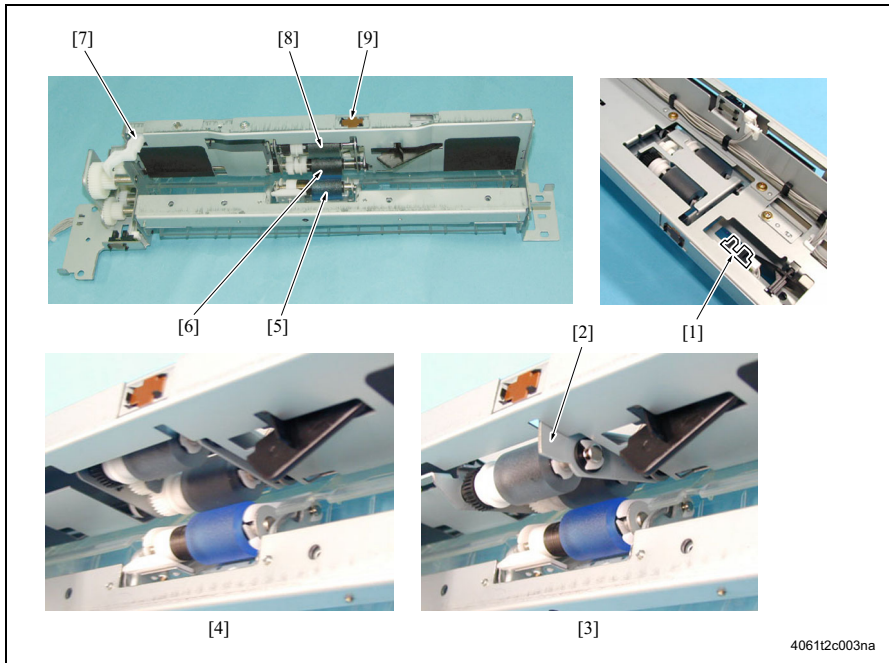
4061t2c002na

## 5. OPERATIONS

### 5.1 Paper Feed Section

#### 5.1.1 Paper feed mechanism

- The Paper Feed Motor (M122, M123) drives the Pick-up Roller [8] and Feed Roller [6] to take up and feed a sheet of paper into the main body.
- Then, the Vertical Conveyance Motor /3, /4 (M120, M121) transports the paper through the vertical conveyance section.
- The Pick-up Roller takes up sheet of paper and the Feed Roller and Separation Roller [5] ensure that only one sheet of paper is separated and fed into the main body.
- When the Tray is slid in, the lever [7] is pushed to lower the Pick-up Roller.
- The Upper Limit Sensor /3, /4 (PS114, PS123) [9] then detects the upper limit position when the paper lifting plate is raised.
- The Paper Empty Sensor /3, /4 (PS115, PS124) [1] detects when paper in the Tray runs out.



- [1] Paper Empty Sensor /3, /4 (PS115, PS124)
- [2] Actuator
- [3] Pick-up Roller Feed Position
- [4] Pick-up Roller Home Position
- [5] Separation Roller

- [6] Feed Roller
- [7] Lever
- [8] Pick-up Roller
- [9] Upper Limit Sensor /3, /4 (PS114, PS123)

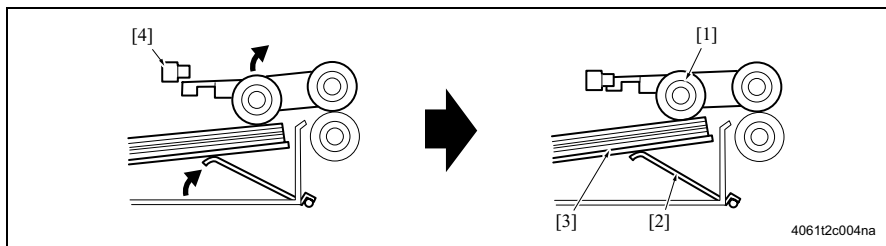


### 5.1.2 Paper lifting motion

- When the Tray is slid into the main body and the Tray Set Sensor /3, /4 (PS112, PS121) is activated, the Paper Lift Motor /3, /4 (M124, M125) starts rotating to raise the Lifting Plate [3].
- The paper stack of the Tray pushes up the Pick-up Roller [1]. When the upper limit position is detected by the Upper Limit Sensor /3, /4 (PS114, PS123) [4], it stops raising the lifting plate.
- As paper is consumed during the print cycle and the Pick-up Roller is lowered, M124, M125 is energized until PS114, PS123 is blocked again.

#### A. When the Tray is slid in

- The lifting plate [3] goes up and the top surface of the paper stack pushes up the roller [1].
- The lifting motion stops as soon as the Upper Limit Sensor /3, /4 (PS114, PS123) detects the upper limit position.



[1] Pick-up Roller

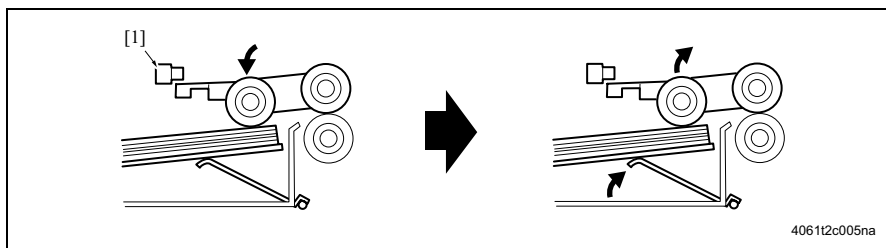
[3] Lifting Plate

[2] Lift-up Arm

[4] Upper Limit Sensor /3, /4 (PS114, PS123)

#### B. During a print cycle

- As the paper is consumed, the Upper Limit Sensor /3, /4 (PS114, PS123) [1] is unblocked.
- The lifting plate goes up.

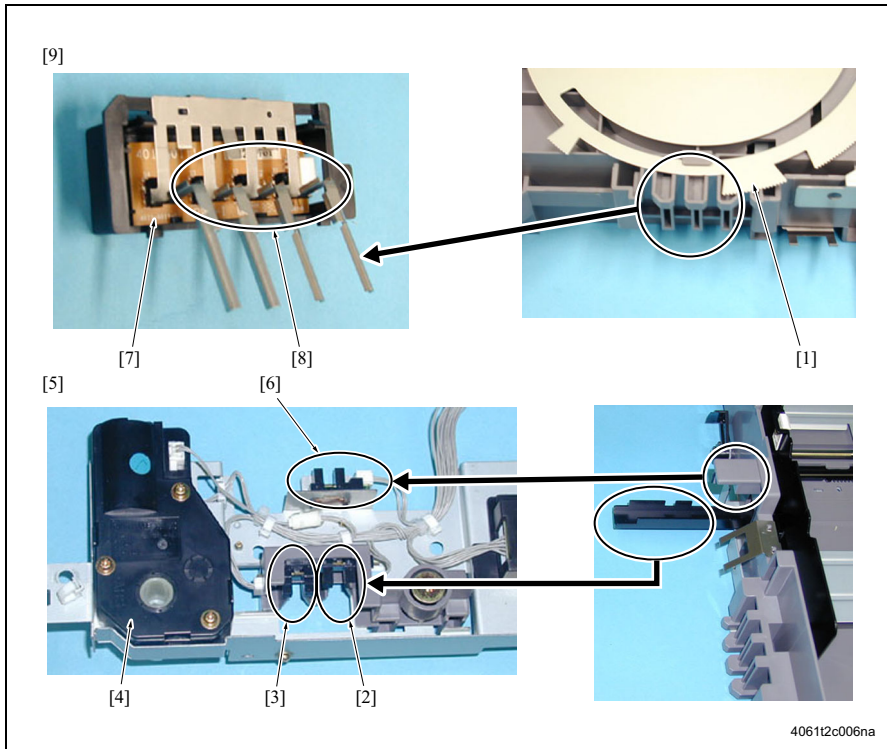


[1] Upper Limit Sensor /3, /4 (PS114, PS123)

## 5.2 Tray Section

### 5.2.1 Paper size detection

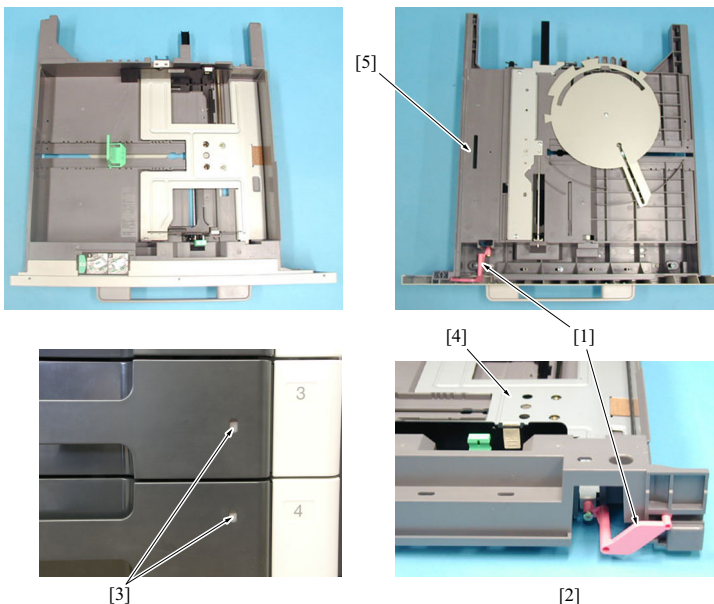
- Moving the Sub Scan Direction Restriction Plate of the Tray rotates the Circular Plate [1] provided on the bottom of the Tray.
- The length of paper in the sub scan direction is detected by the Paper Size Detection Switch [8] provided on the Paper Size Detect Boards /3 and /4 (PSDB3, PSDB4) [7] that is driven by the Lever interlocked with the Circular Plate.
- The detection of the length of paper in the main scan direction is made by detecting a notch on the Lever of the Main Scan Direction Restriction Plate by the Paper Size Sensors /Rr3, /Fr3 (PS118, PS119) [2] or /Rr4, /Fr4 (PS127, PS128) [3].
- The paper size is determined by the combination of the 4 Paper Size Detection Switches and the 2 Paper Size Sensors.
- The setting of the Tray is detected by the Tray Set Sensors /3, /4 (PS112, PS121) [6].



- |   |   |
|---|---|
| [1] Circular Plate                              | [6] Tray Set Sensor /3, /4 (PS112, PS121)         |
| [2] Paper Size Sensor /Rr3, /Rr4 (PS118, PS127) | [7] Paper Size Detect Board /3, /4 (PSDB3, PSDB4) |
| [3] Paper Size Sensor /Fr3, /Fr4 (PS119, PS128) | [8] Paper Size Detection Switch                   |
| [4] Paper Lift Motor /3, /4 (M124, M125)        | [9] Sub scan direction size detection             |
| [5] Main scan direction size detection          |   |

### 5.2.2 Paper level indicator mechanism

- All Trays are universal paper size tray.
- There is a window in the front cover of the Tray that serves as the Paper Level Indicator [3] showing the amount of paper that is still available for use.
- A red lever [1] is attached to the bottom plate [5] of the Tray and as the lifting plate [4] raises, the red lever becomes visible in the window.
- The more the red lever is visible, the lesser the amount of paper will be available for use.



4061t2c007nb

[1] Lever

[2] Operated by the Lifting Plate

[3] Paper Level Indicator

[4] Lifting Plate

[5] Tray Bottom Plate



KONICA MINOLTA

## SERVICE MANUAL

Theory of Operation

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# PC-407





## (bizhub 501/421/361 )

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■ OUTLINE

1. PRODUCT SPECIFICATION

A. Type

Name	2500 sheets paper feed cabinet
Type	Front loading type LCC
Installation	Desk type
Document Alignment	Center

B. Paper type

Paper Type	Same as the main body.
Paper Size	Metric: A4 Inch: 8½ × 11
Capacity	2500 sheets (80 g/m <sup>2</sup> )

C. Maintenance

Maintenance	Same as the main body.
-------------	------------------------

D. Machine specifications

Power Requirements	24V DC ± 10 %, 5V DC ± 5 % (supplied from the main body)
Power Consumption	45 W or less
Dimensions	570 mm (W) × 577 mm (D) × 300 mm (H)
Weight	Approx. 26.0 kg

E. Operating environment

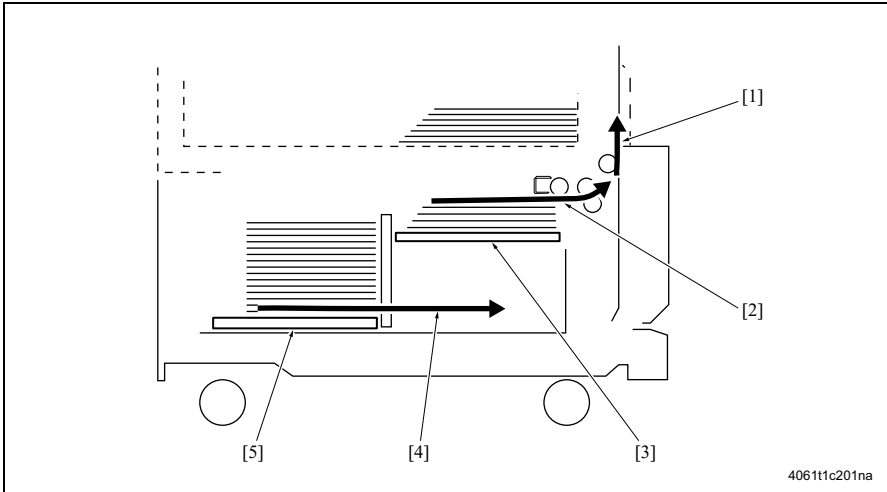
Temperature	Same as the main body.
Humidity	Same as the main body.

NOTE

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## 2. PAPER PATH



[1] Convey to the main body

[4] From the Sub Tray to Main Tray

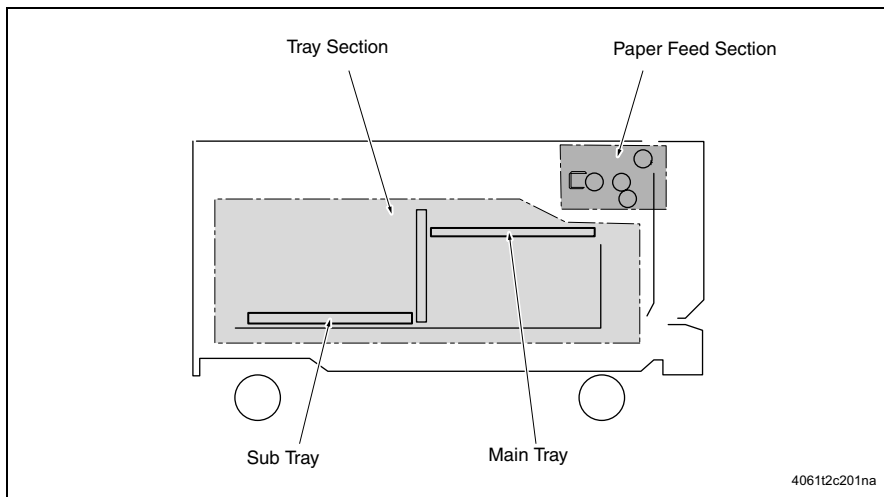
[2] Tray paper feed

[5] Sub Tray

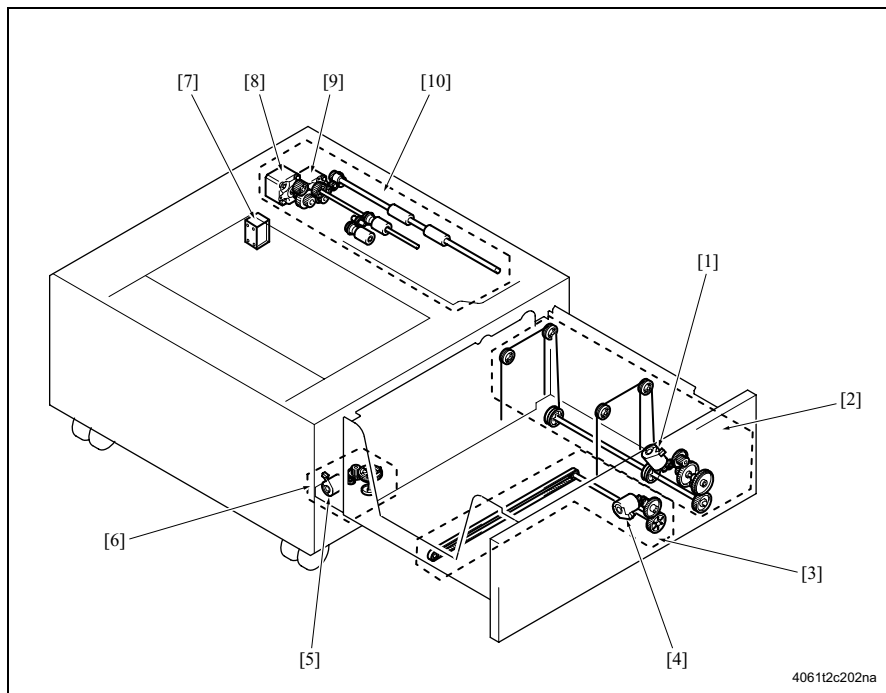
[3] Main Tray

## ■ COMPOSITION/OPERATION

### 3. COMPOSITION



## 4. DRIVE



4061t2c202na

- [1] Paper Lift Motor (M5)
- [2] Paper Lift Drive Section
- [3] Shifter Drive Section
- [4] Shift Motor (M4)
- [5] Shift Gate Motor (M3)

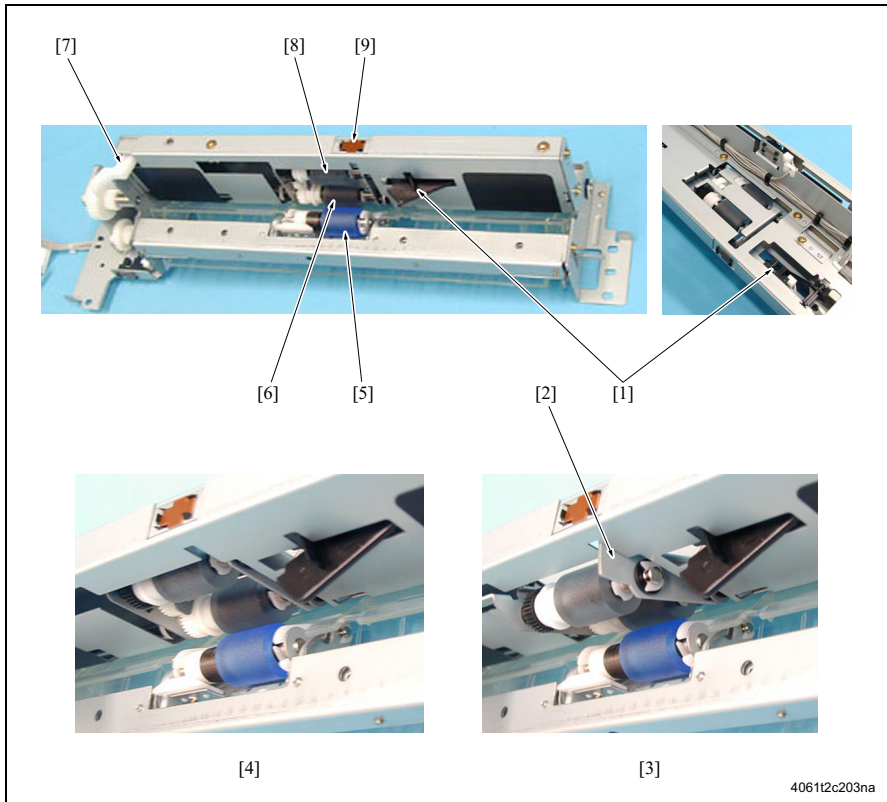
- [6] Shift Gate Drive Section
- [7] Tray Lock Solenoid (SD1)
- [8] Paper Feed Motor (M1)
- [9] Vertical Conveyance Motor (M2)
- [10] Vertical Conveyance Drive Section

## 5. OPERATIONS

### 5.1 Paper Feed Section

#### 5.1.1 Paper feed mechanism

- The Paper Feed Motor (M1) drives the Pick-up Roller [8] and Feed Roller [6] to take up and feed a sheet of paper into the main body.
- Then, the Vertical Conveyance Motor (M2) transports the paper through the vertical conveyance section.
- The Pick-up Roller takes up sheet of paper and the Feed and Separation Rollers [5] ensure that only one sheet of paper is separated and fed into the main body.
- When the Tray is slid in, the lever [7] is pushed to lower the Pick-up Roller.
- The Upper Limit Sensor (PS4) [9] then detects the upper limit position when the paper lifting plate is raised.
- The Paper Empty Sensor (PS3) [1] detects when paper in the Main Tray runs out.



[1] Paper Empty Sensor (PS3)

[2] Actuator

[3] Pick-up Roller Feed Position

[4] Pick-up Roller Home Position

[5] Separation Roller

[6] Feed Roller

[7] Lever

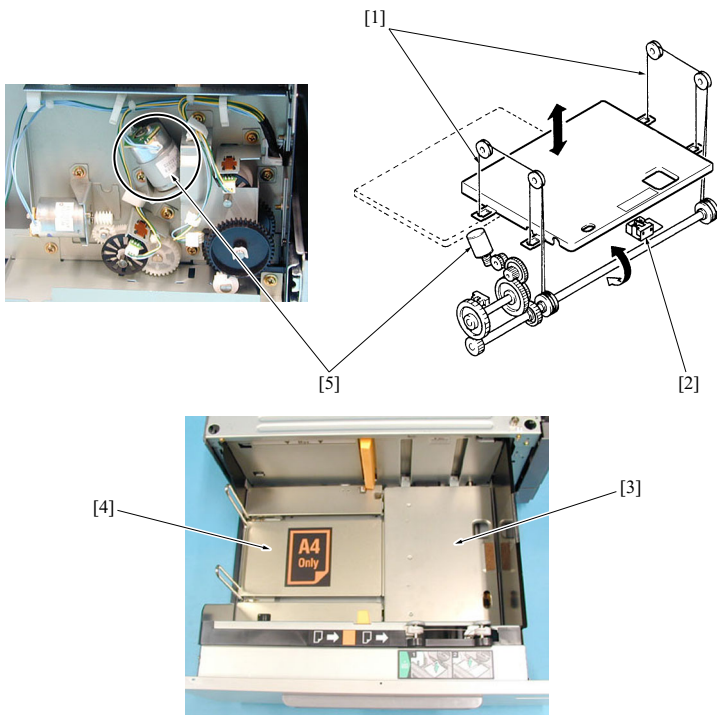
[8] Pick-up Roller

[9] Upper limit Sensor (PS4)

## 5.2 Tray Section

### 5.2.1 Up/down mechanism

- The Main Tray [3] is suspended by the cables [1] at the front and rear.
- As the Paper Lift Motor (M5) [5] turns forward or backward, the cables are wound to raise or lower the Main Tray.
- The Lower Limit Sensor (PS13) [2] detects the Main Tray at its lower limit position.



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[1] Cables

[2] Lower Limit Sensor (PS13)

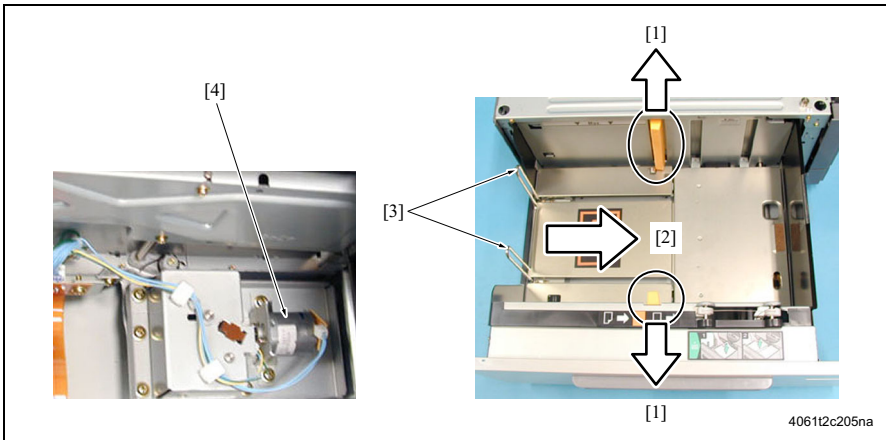
[3] Main Tray

[4] Sub Tray

[5] Paper Lift Motor (M5)

### 5.2.2 Shift Gate drive mechanism

- If the Main Tray runs out of paper, while the Sub Tray is loaded with paper, the paper stack on the Sub Tray is moved to the Main Tray [2].
- At this time, the Shift Gate Motor (M3) [4] is energized to retract the front and rear Shift Gates [1].



[1] Shift Gate move to outside

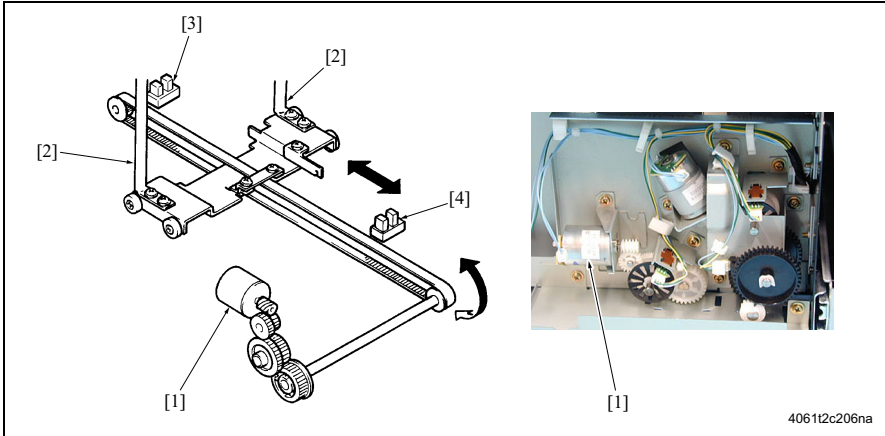
[2] Shifter move

[3] Shifter

[4] Shift Gate Motor (M3)

### 5.2.3 Shifter drive mechanism

- After completion of the evacuation of the Shift Gate, starts the movement of the Shifter [2].
- The movement of paper from the Sub Tray to the Main Tray is made by the Shifter that is driven by the Shift Motor (M4) [1].
- The stopping of the movement of the Shifter to the Main Tray side is made by the Shift Position Sensor (PS11) [4].
- The movement to the home position starts when the Tray Release Key is pressed.
- The stopping of the movement of the Shifter to the home position is made by the Shift Home Sensor (PS12) [3].



[1] Shift Motor (M4)

[2] Shifter

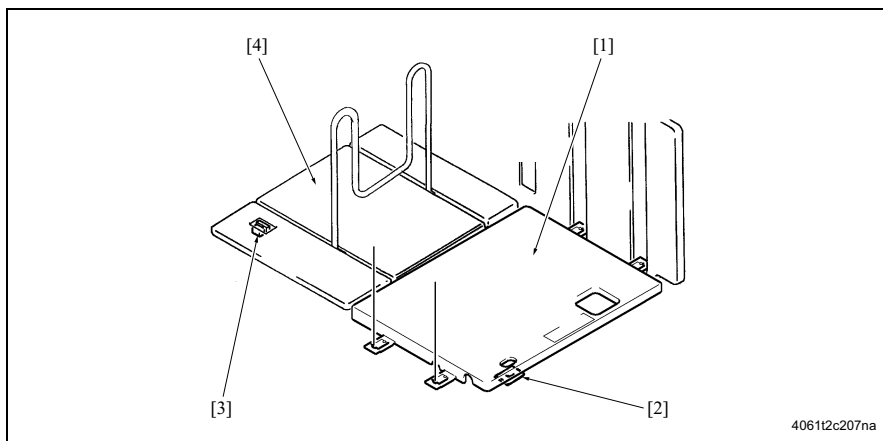
[3] Shift Home Sensor (PS12)

[4] Shift Position Sensor (PS11)

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### 5.2.4 Paper empty detection

- Paper empty detection of Main Tray is performed by Main Tray Empty Board (MEB) [2].
- Paper empty detection of Sub Tray is performed by Sub Tray Empty Sensor (PS9) [3].



[1] Main Tray

[2] Main Tray Empty Board (MEB)

[3] Sub Tray Empty Sensor (PS9)

[4] Sub Tray



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KONICA MINOLTA

## SERVICE MANUAL

Theory of Operation
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# LU-203

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OUTLINE

1. PRODUCT SPECIFICATION

A. Type

Type	Side mount type large volume paper feed tray
------	--

B. Functions

Maximum tray capacity	2,000 sheets (80 g/m <sup>2</sup> )
-----------------------	-------------------------------------

C. Type of paper

Paper type *1	Plain paper, recycled paper, high quality paper of 60 to 105 g/m <sup>2</sup>
Paper size	A4, 8½ x 11

- \*1 Recommended paper
- Plain paper

Inch: Hammermill Tidal MP (20 lbs)  
Metric: Konica Profi (80 g/m<sup>2</sup>), Konica Minolta Original (80 g/m<sup>2</sup>)
- Recycled paper

Inch: Weyehaeuser Recycled Laser Copy (20 lbs)  
Metric: Nautilus (80 g/m<sup>2</sup>)

D. Maintenance

Maintenance	Same as the main body.
-------------	------------------------

E. Machine data

Power source	24/5V DC (supplied from the main body)
Power consumption	30 W or less (internal heater is not used)
Dimensions	424 (W) x 515 (D) x 295 (H) mm
Weight	Approx. 16 kg

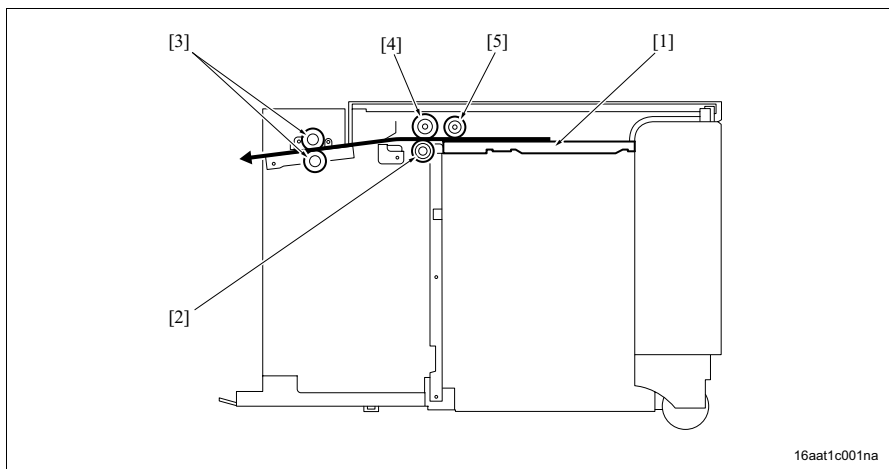
F. Operating environment

Temperature	Same as the main body
Humidity	Same as the main body

Note

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## 2. PAPER PATH

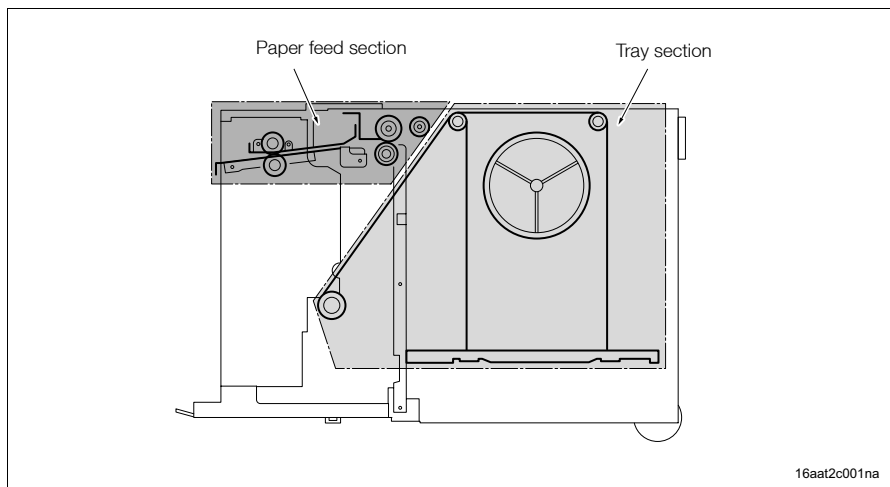


- [1] Lift plate
- [2] Separation roller
- [3] Conveyance roller

- [4] Feed roller
- [5] Pick-up roller

## ■ COMPOSITION/OPERATION

### 3. COMPOSITION



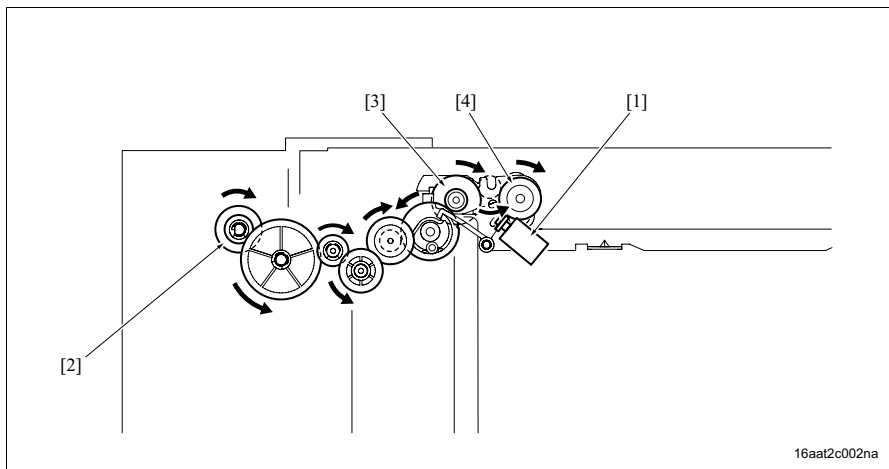


## 4. PAPER FEED SECTION

### 4.1 Drive

#### 4.1.1 Paper feed drive

##### A. Front side drive



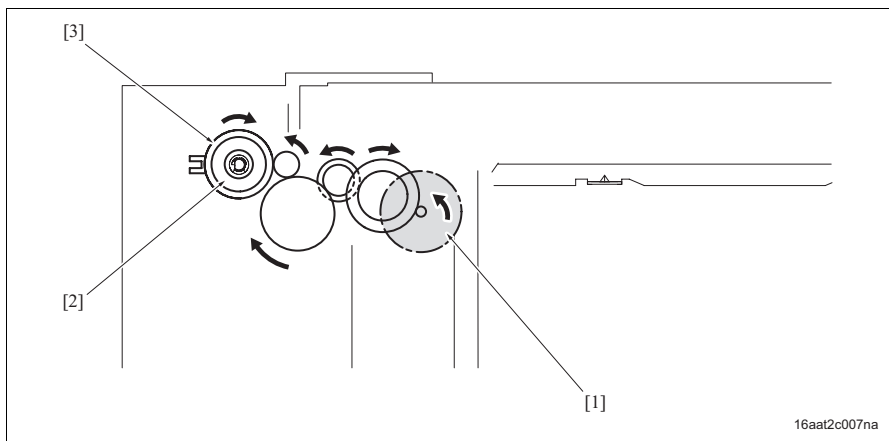
[1] Pick-up solenoid (SD151)

[2] Conveyance roller

[3] Feed roller

[4] Pick-up roller

##### B. Rear side drive



[1] Feed motor (M150)

[2] Conveyance roller

[3] Feed clutch (CL151)

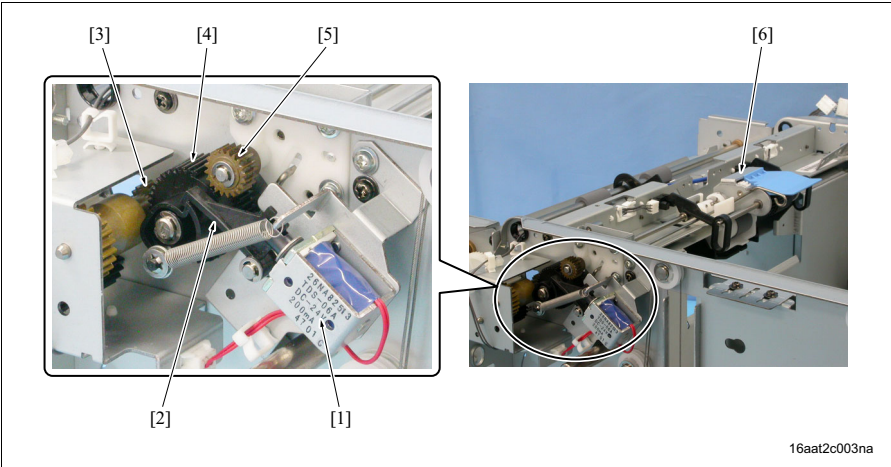
## 4.2 Operation

### 4.2.1 Paper feed control

#### A. Pick-up mechanism

##### (1) Drive transmission

The driving force of the feed motor (M150) is transmitted to the paper feed gear /3 [4] through various gears. The paper feed gear /3 is connected with the pick-up solenoid (SD151) [1] through the claw [2]. When SD151 is turned OFF, the coupling between the paper feed gear /3 and the paper feed coupling gear /B [3] provided on the front stage is disengaged and the paper feed gear /3 does not rotate. When SD151 turns ON, the claw is released to engage the paper feed gear /3 to the paper feed coupling gear /B. In this way, the paper feed gear /3 rotates and the driving force is transmitted to the paper feed roller unit [6] through the paper feed gear [5] to pick up paper.

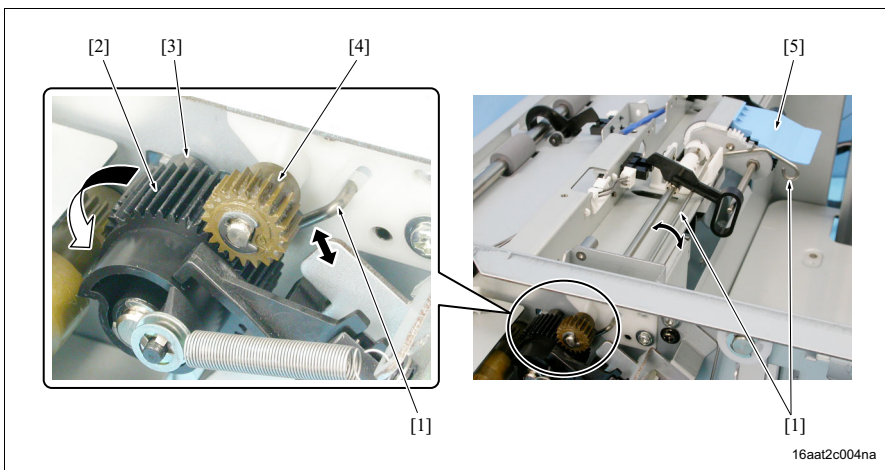


- [1] Pick-up solenoid (SD151)
- [2] Claw
- [3] Paper feed coupling gear /B

- [4] Paper feed gear /3
- [5] Paper feed gear
- [6] Paper feed roller unit

**(2) Paper feed roller unit up/down mechanism**

On the inside of the paper feed gear /3 [2], the cam [3] is provided. While in the standby, the cam pushes the lift-up shaft [1]. The lift-up shaft is in contact with the paper feed roller unit [5] and it lifts up the paper feed roller unit while it is being pushed by the cam. When the paper feed gear /3 rotates, the pressure by the cam on the lift-up shaft is released and the paper feed roller unit goes down. In this way, the paper feed roller unit goes up and down while the paper feed gear /3 is rotating a full turn to pick up paper.



[1] Lift-up shaft

[2] Paper feed gear /3

[3] Cam

[4] Paper feed gear

[5] Paper feed roller unit

**B. Paper feed operation**

A specified period of time after a start signal from the main body turns ON, the feed motor (M150), the feed clutch (CL151) and the pick-up solenoid (SD151) turn ON to pick up paper from the tray. SD151 turns OFF a specified period of time after that. However, it turns ON and OFF according to the paper feed request signal to pick up the second and succeeding sheets of paper. Paper thus picked up is conveyed to the PC by the conveyance roller to be further conveyed to the registration section of the main body through the vertical conveyance roller in the PC.

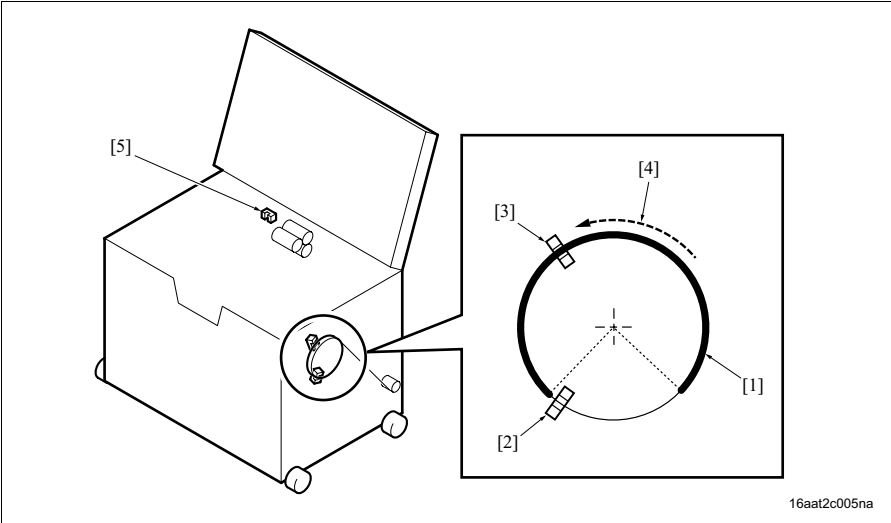
The conveyance roller is provided with CL151 and, when the registration sensor (PS1) of the main body detects the leading edge of paper and turns ON, it turns OFF a specified period of time after that to stop the conveyance roller and the paper feed roller unit. At this time, the registration section of the main body stops temporarily to control the registration and all the rollers that are positioned upstream of the registration roller also stop. In this way, paper thus supplied is put in the standby condition in each position of the registration section, the conveyance path and the LU exit section.

When a print signal is received, a specified period of time after that, each roller in the conveyance path and CL151 turn ON to resume the conveyance of paper.

4.2.2 Remaining paper detection control

As paper in the tray gets reduced, the lift plate goes up gradually. The actuator [1] provided on the rear side of LU rotates in interlock with the up/down operation of the lift plate. The actuator is provided with the remaining paper sensors /1 (PS154) [3] and /2 (PS151) [2] and the remaining paper is detected by the combination of the ON/OFF of these sensors. And the no paper detection in the tray is made by the paper empty sensor (PS153) [5].

Remaining paper quantity	PS151	PS154
Full quantity	OFF	ON
Medium quantity	ON	ON
Small quantity	ON	OFF



- [1] Actuator

[2] Remaining paper sensor /2 (PS151)

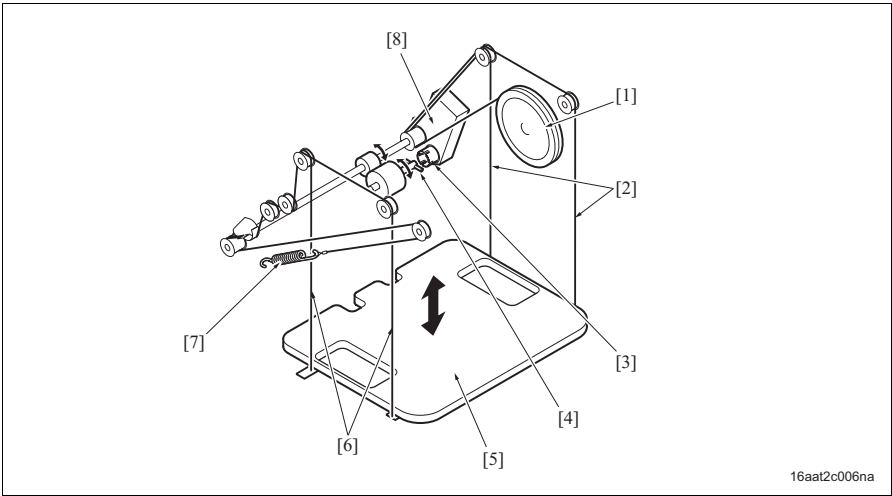
[3] Remaining paper sensor /1 (PS154)
- [4] Direction of rotation when the tray goes up

[5] Paper empty sensor (PS153)

5. TRAY SECTION

5.1 Drive

5.1.1 Tray lift drive



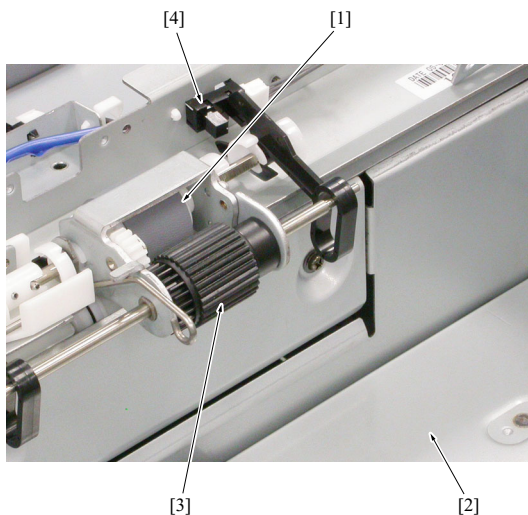
- |                  |                             |
|------------------|-----------------------------|
| [1] Actuator     | [5] Lift plate              |
| [2] Wire         | [6] Wire                    |
| [3] Coupling     | [7] Spring                  |
| [4] Parallel pin | [8] Paper lift motor (M151) |

## 5.2 Operation

### 5.2.1 Tray lift control

When the upper door is closed, a parallel pin for the up drive of the lift plate is pushed out to be coupled to the coupling of the paper lift motor (M151). Closing the upper door also turn ON the upper door interlock switch (MS151) to supply a 24V DC to the load of the drive system. In this way, M151 turns ON to bring up the lift plate. When the lift plate goes up and the upper limit sensor (PS152) detects the upper surface of paper, M151 turns OFF to stop the up drive of the lift plate. When PS152 turns OFF by the paper feed operation, M151 turns ON again to keep on bringing up the lift plate until PS152 turns ON.

When the upper door is opened, the wire is pulled to release the coupling for the up drive of the lift plate. In this way, the lift plate goes down up to the position in which a balance is kept between the weight of paper and the spring tension.



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[1] Feed roller

[2] Lift plate

[3] Pick-up roller

[4] Upper limit sensor (PS152)

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KONICA MINOLTA

## SERVICE MANUAL

Theory of Operation

---

# FS-522/PU-501/ OT-602







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FS-522/PU-501/OT-602

OUTLINE

COMPOSITION/OPERATION

# ■ OUTLINE

## 1. PRODUCT SPECIFICATIONS

### 1.1 FS-522

#### A. Type

Name	Multi tray finisher built into the main body
Installation	Installed in the main body
Document Alignment	Center
Consumables	Staples (5,000 staples/cartridge)

#### B. Functions

Modes	Non sort, sort, group, sort staple, and punch (when PU-501 is mounted)
-------	--

#### C. Paper type

##### (1) Non sort

Type	Size	Weight	Max. Capacity		
Plain paper	Metric: A3, B4, A4, A4S, B5, B5S *2, A5S, B6S 11 x 17, 8½ x 11, 8½ x 11S, Foolscap, 8K *1, 16K *1, 16KS *1	50 to 90 g/m <sup>2</sup>	Tray /1	200 sheets	
			Tray /2	A4S, 8½ x 11S or less 1000 sheets	
Recycled paper	8½ x 11S, Foolscap, 8K *1, 16K *1, 16KS *1	B4, 8½ x 14 or greater 500 sheets			
Thick paper		91 to 210 g/m <sup>2</sup>	20 sheets		
OHP transparencies	-				
Envelope	-				
Label paper	-				
Letterhead	-				

\*1: Only supported in Taiwan.

\*2: Supported in other than inch area and Taiwan.

##### (2) Sort/Group

Type	Size	Weight	Max. Capacity	
Plain paper	Metric: A3, B4, A4, A4S, B5, B5S *2 11 x 17, 8½ x 11, 8½ x 11S, Foolscap, 8K *1, 16K *1, 16KS *1	56 to 90 g/m <sup>2</sup>	Tray /1	200 sheets
			Tray /2	A4S, 8½ x 11S or less 1000 sheets
Recycled paper	Inch: 11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S A3, A4, A4S, Foolscap			B4, 8½ x 14 or greater 500 sheets

\*1: Only supported in Taiwan.

\*2: Supported in other than inch area and Taiwan.

(3) Sort Staple

Type	Size	Weight	Max. Capacity		
Plain paper	Metric: A3, B4, A4, A4S, B5, B5S *2 11 x 17, 8½ x 11, 8½ x 11S, Foolscap, 8K *1, 16K *1, 16KS *1	56 to 90 g/m <sup>2</sup>	Tray /1	200 sheets	
			Tray /2	A4S, 8½ x 11S or less	1000 sheets
Recycled paper	Inch: 11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S A3, A4, A4S, Foolscap			B4, 8½ x 14 or greater	500 sheets

\*1: Only supported in Taiwan.  
\*2: Supported in other than inch area and Taiwan.

D. Stapling

Staple Filling Mode	Dedicated Staple Cartridge (5000 staples)				
Staple Detection	Available (Nearly Empty: 20 remaining staples)				
Stapling Position	Front: Diagonal 45° 1 point *1	A3, B4, A4, B5			
	Rear: Diagonal 45° 1 point *1	11 x 17, 8½ x 11			
	Front: Parallel 1 point	A4S, B5S			
	Rear: Parallel 1 point	8½ x 14, 8½ x 11S			
	Side: Parallel 2 point	A3, B4, A4, A4S, B5, B5S 11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S			

\*1: Diagonal 30° for B5 and B4

E. Maintenance

Maintenance	Same as the main body.
-------------	------------------------

F. Machine specifications

Power Requirements	24/5V DC (supplied from the main body)
Power Consumption	66 W or less
Dimensions	319 (W) x 558 (D) x 573 mm (H)
Weight	Approx. 21.4 kg

G. Operating environment

Temperature	Same as the main body.
Humidity	Same as the main body.

## 1.2 PU-501

### A. Type

Type	FS built-in type punching operation device
Installation	Screwed to the FS
Paper Size	Metric: A3, B4, A4, A4S, B5 11 x 17, 8½ x 11, 8K *1, 16K *1  Inch: 2 holes: 11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S A3, A4, A4S, Foolscap 3 holes: 11 x 17, 8½ x 11 A3, A4
Paper Type	Plain Paper (60 to 163 g/m <sup>2</sup> ), Recycled Paper (60 to 163 g/m <sup>2</sup> )
Punch Hole	Metric: 4 holes, Swedish 4 holes (ø 6.5 mm) Inch: 2 and 3 holes (can be switched) (ø 8 mm)
Number of Stored Punch Wastes	Metric (4 holes): For 1,500 sheets of paper (80 g/m <sup>2</sup> ) Inch (2, 3 holes): For 1,000 sheets of paper (75 g/m <sup>2</sup> )
Document Alignment	Center

\*1: Only supported in Taiwan.

### B. Maintenance

Maintenance	Same as the main body.
-------------	------------------------

### C. Machine specifications

Power Requirements	24/5V DC (Supplied from FS)
Dimensions	114 (W) x 461 (D) x 136 mm (H)
Weight	Approx. 1.9 kg

### D. Operating environment

Temperature	Same as the main body.
Humidity	Same as the main body.

### 1.3 OT-602

#### A. Type

Type	Additional Tray to FS
Installation	Screwed to the FS
Mode	Non sort, sort, group, and sort staple
Number of Bins	1 bin
Document Alignment	Center

#### B. Paper Type

Mode	Size	Type	Capacity
Non sort	Metric: A3, B4, A4, A4S, B5, B5S *2, A5S, B6S 11 x 17, 8½ x 11, 8½ x 11S, Foolscap, 8K *1, 16K *1, 16KS *1  Inch: 11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S, 5½ x 8½S A3, A4, A4S, Foolscap	Plain Paper, Recycled Paper (50 to 90 g/m <sup>2</sup> )	200 sheets
		Special	OHP transparencies
			Thick paper (91 to 210 g/m <sup>2</sup> )
			Envelope
			Label paper
		Letterhead	20 sheets
Sort / group	Metric: A3, B4, A4, A4S, B5, B5S *2 11 x 17, 8½ x 11, 8½ x 11S, Foolscap, 8K *1, 16K *1, 16KS *1	Plain Paper, Recycled paper (56 to 90 g/m <sup>2</sup> )	200 sheets
Sort staple	Inch: 11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S A3, A4, A4S, Foolscap		200 sheets or 20 copies

\*1: Only supported in Taiwan.

\*2: Supported in other than inch area and Taiwan.

#### C. Maintenance

Maintenance	Same as the main body.
-------------	------------------------

#### D. Machine specifications

Dimensions	282 (W) x 368 (D) x 57 mm (H)
Weight	Approx. 0.7 kg

#### E. Operating environment

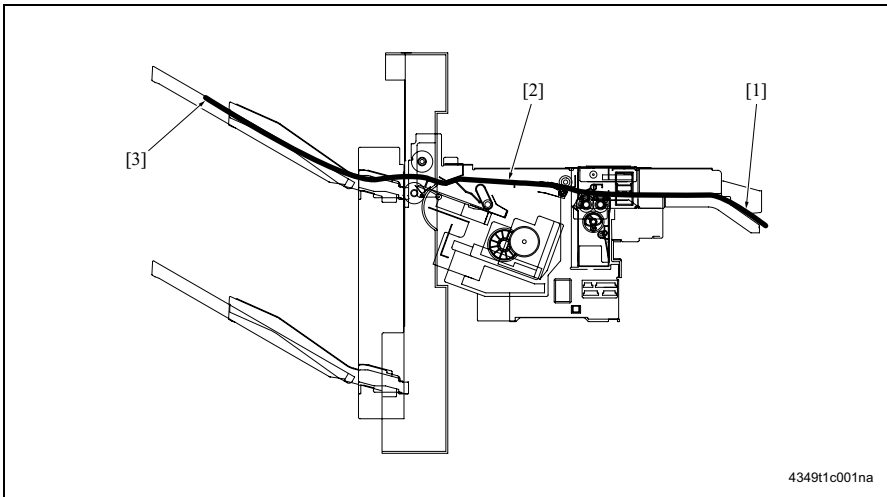
Temperature	Same as the main body.
Humidity	Same as the main body.

#### NOTE

- The information herein may be subject to change for improvement without notice.

## 2. PAPER PATH

### 2.1 Exiting Paper to the Tray /1



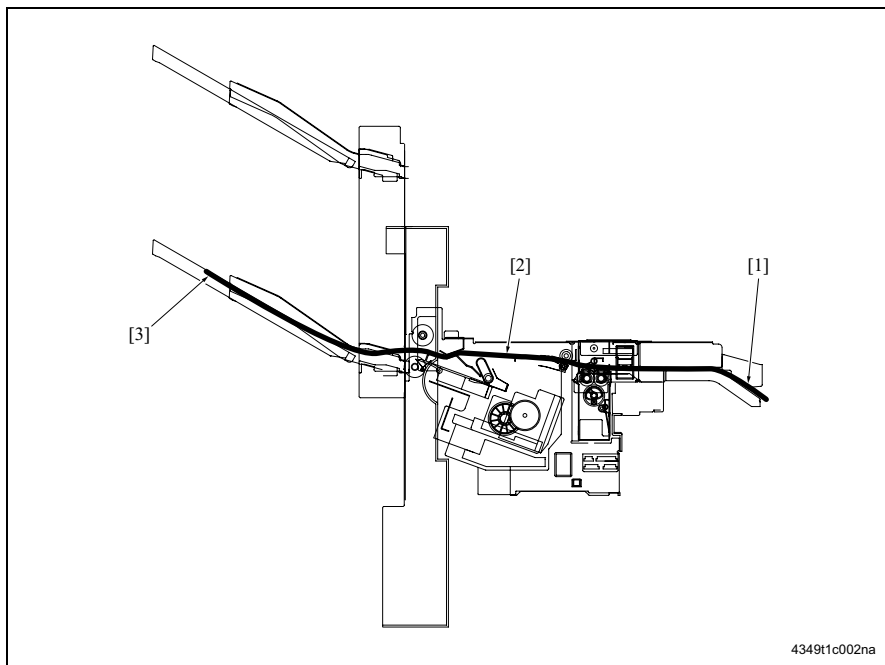
[1] From the main body

[3] Exiting paper to the Tray /1

[2] Convey to the Tray /1



## 2.2 Exiting Paper to the Tray /2

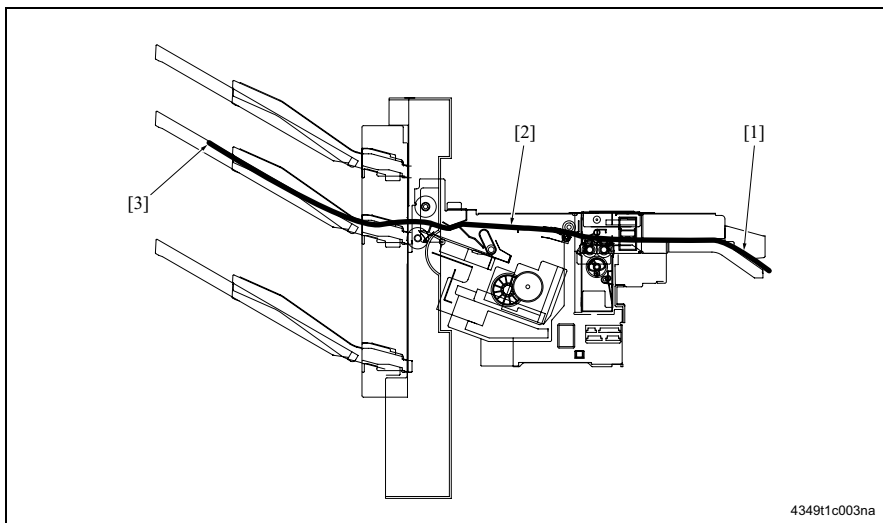


[1] From the main body

[2] Convey to the Tray /2

[3] Exiting paper to the Tray /2

## 2.3 Exiting Paper to OT



[1] From the main body

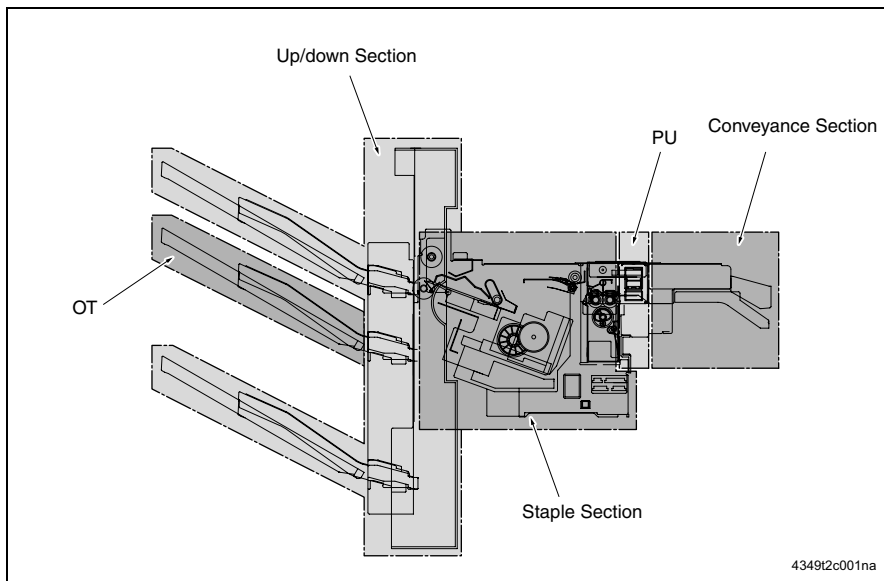
[2] Convey to OT

[3] Exiting paper to OT

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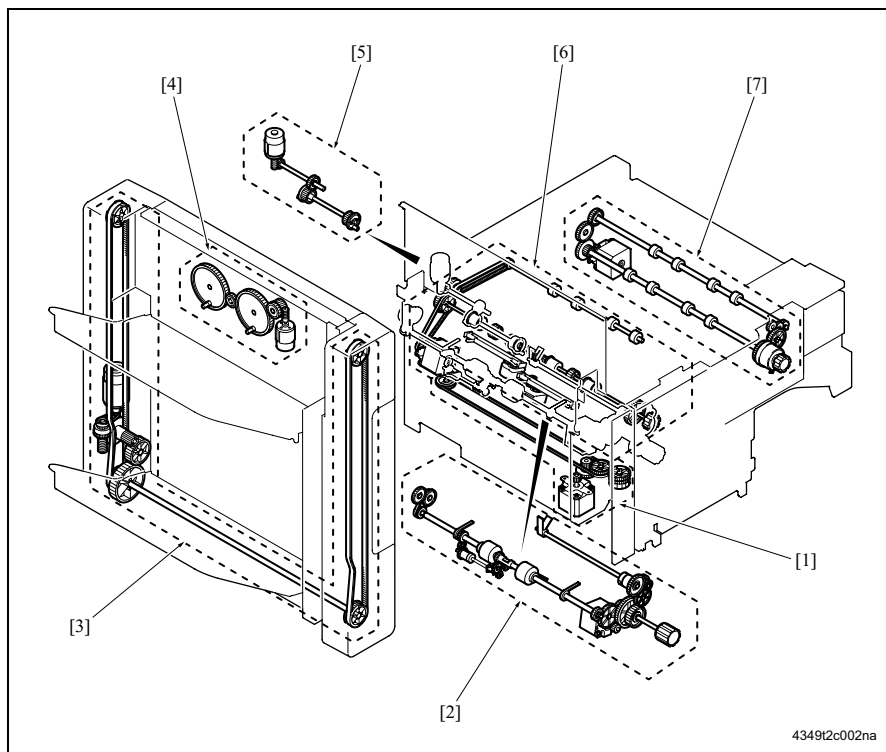
## ■ COMPOSITION/OPERATION

### 3. COMPOSITION



## 4. DRIVE

### 4.1 FS-522

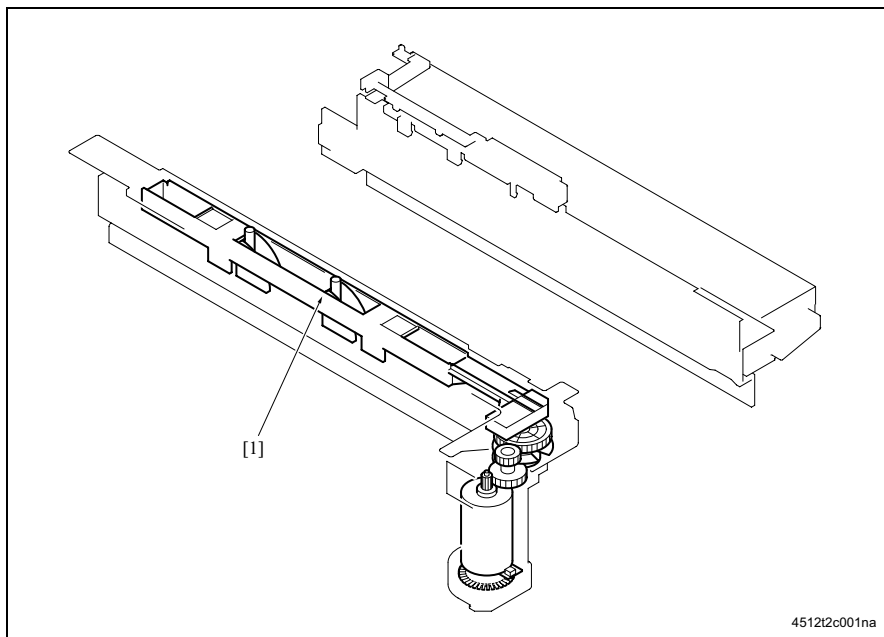


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- [1] Stapler Drive Section
- [2] Exit Drive Section
- [3] Up/down Drive Section
- [4] Shutter Drive Section

- [5] Paper Exit Opening Drive Section
- [6] Conveyance/Alignment Drive Section
- [7] Entrance Drive Section

## 4.2 PU-501

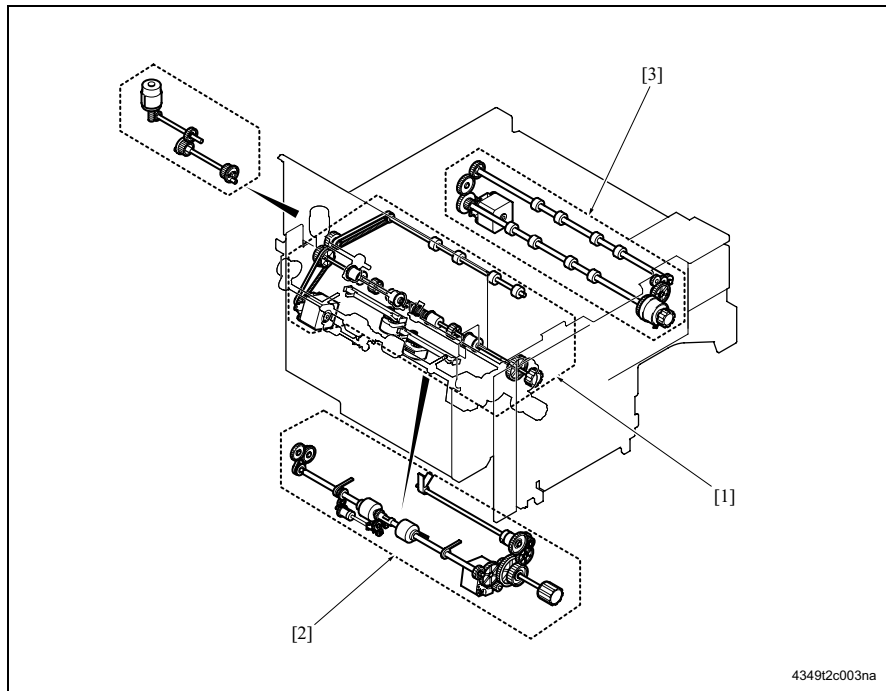


[1] Punch Drive Section

## 5. OPERATIONS

### 5.1 Conveyance Section

- The Conveyance Section is divided into the entrance conveyance section [3], intermediate conveyance section [1], and the exit conveyance section [2]. It controls to convey the paper fed from the main body, stop the paper at the punching and folding positions, and drive the paper for feeding into the exit section.



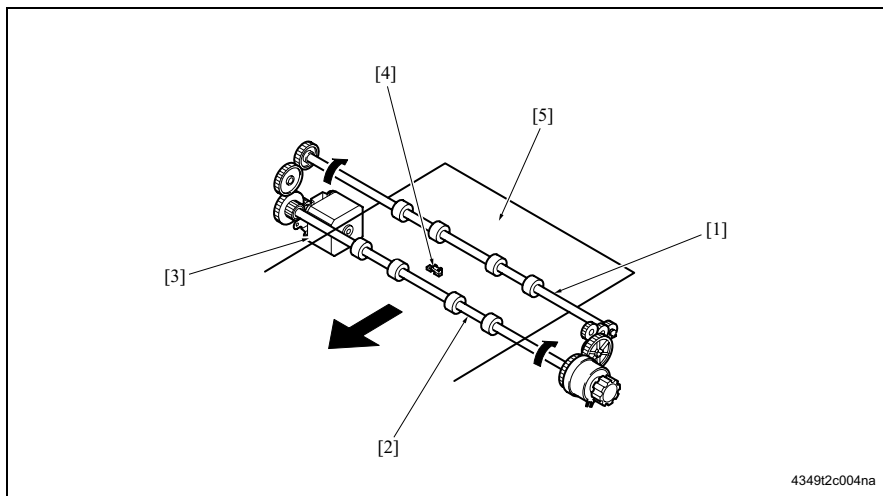
[1] Intermediate Conveyance Section

[3] Entrance Conveyance Section

[2] Exit Conveyance Section

### 5.1.1 Entrance/Conveyance section

- A paper [5] fed from the main body is conveyed to the intermediate conveyance section.
- The Entrance Motor (M3) [3] provides the drive for conveying a paper.
- When the M3 is energized, the Entrance Roller [1] and Registration Roller [2] are driven to rotate.
- The Entrance Sensor (PS4) [4] detects a paper in the conveyance section.



[1] Entrance Roller

[2] Registration Roller

[3] Entrance motor (M3)

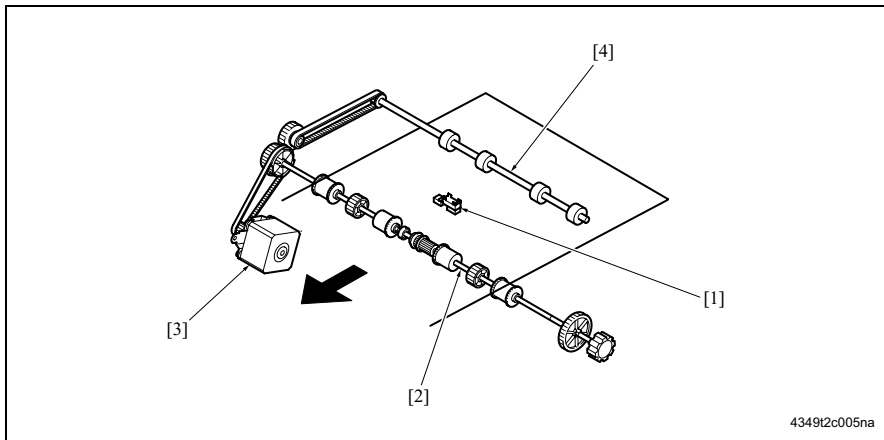
[4] Entrance sensor (PS4)

[5] Paper



### 5.1.2 Intermediate Conveyance Section

- A paper conveyed from the entrance conveyance section is brought to a stop at the punching and folding position.
- A paper is also conveyed to the exit conveyance section.
- Drive for the intermediate conveyance section is provided by the Conveyance Motor (M2) [3]. Drive of the Intermediate Conveyance Roller /1 [4] and Intermediate Conveyance Roller /2 [2] is controlled.
- The Conveyance Sensor (PS5) [1] detects paper in the intermediate conveyance section.



[1] Conveyance Sensor (PS5)

[2] Intermediate Conveyance Roller /2

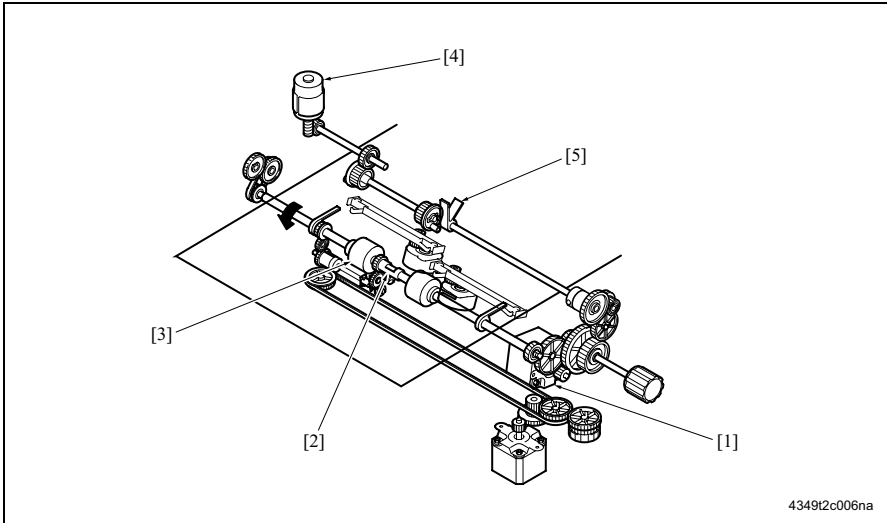
[3] Conveyance Motor (M2)

[4] Intermediate Conveyance Roller /1

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### 5.1.3 Exit Conveyance Section

- The paper is exited onto each of the trays.
- The Exit Motor (M1) [1] provides drive for the Exit Roller [3], Stacker Paddle [5], and Exit Paddle [2].



[1] Exit motor (M1)

[2] Exit Paddle

[3] Exit Roller

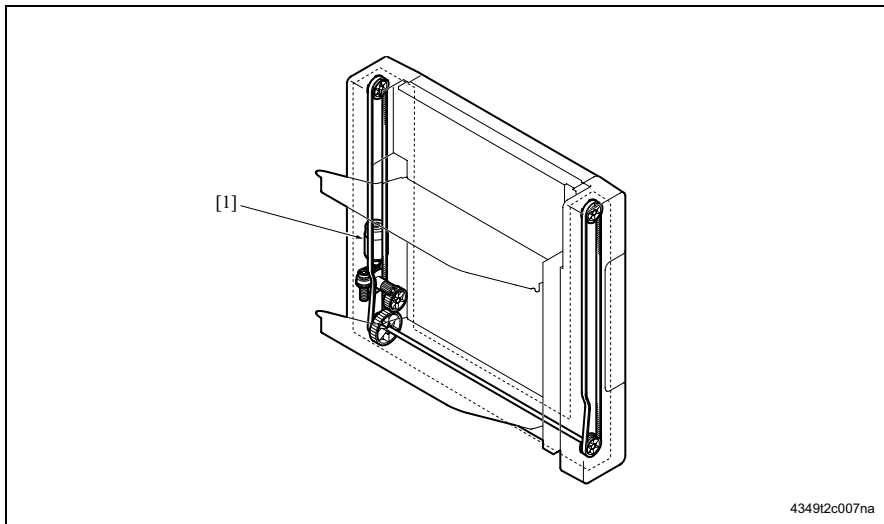
[4] Exit roller release motor (M6)

[5] Stacker Paddle

## 5.2 Up/down Section

### 5.2.1 Up/down mechanism

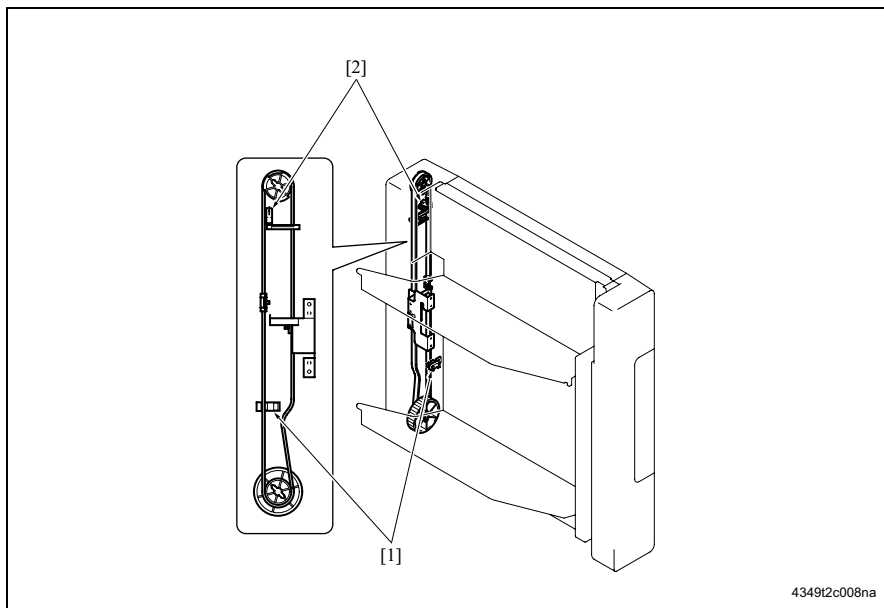
- The Up/down mechanism is operated to select a specific tray, thereby feeding the paper exit onto a specific tray.



[1] Tray Lift Motor (M11)

### 5.2.2 Tray Up/Down operation

- The Tray is moved up or down by the Tray Lift Motor (M11) that turns forward or backward to drive the front and rear belts.
- The Lower Limit Sensor (PS14) [1] detects the Tray at its lower limit position.
- The Tray Overrun Switch (SW3) [2] is provided for protection when the trays overrun normal position.



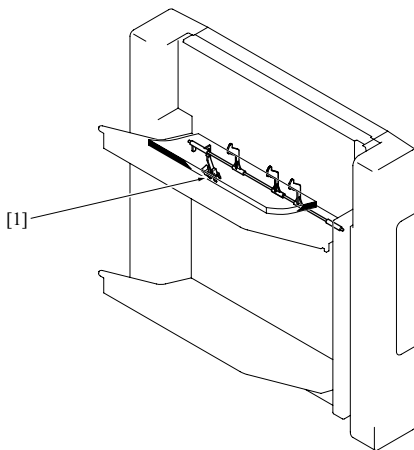
[1] Lower Limit Sensor (PS14)

[2] Tray Overrun Switch (SW3)

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### 5.2.3 Tray Upper Limit Position Detection Mechanism

- Each of the Tray moves up or down according to the amount of paper fed onto it.
- When the Upper Limit Sensor (PS15) [1] turns ON for each exit of paper, bring down once the Lift Tray until PS15 turns OFF so that the upper surface of paper on the Tray is kept at the same level at all times while in the paper exit.
- Bring up again the Tray until PS15 turns ON.



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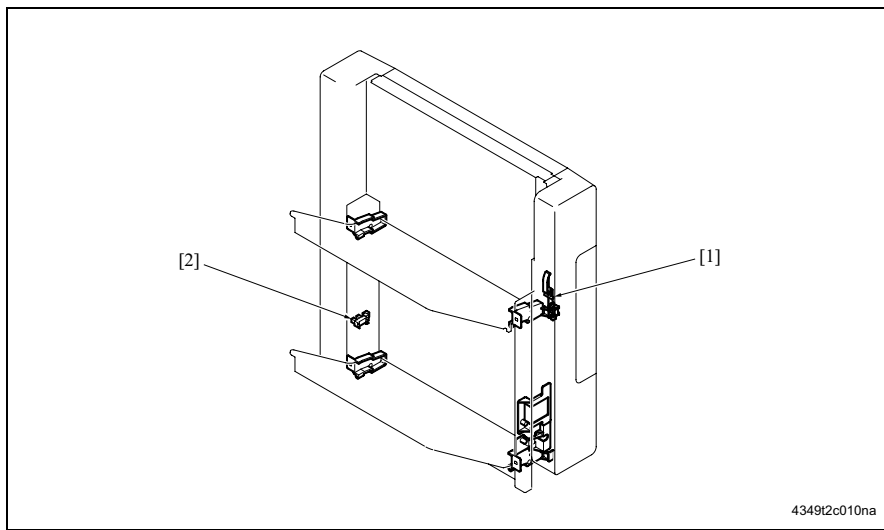
[1] Upper Limit Sensor (PS15)

**A. Tray Position Detection**

- Tray position detection is controlled according to the number of times the Tray Position Sensor (PS3) [1] is activated after the Lower Limit Sensor (PS14) [2] has been activated.

**(1) Tray position detection operation**

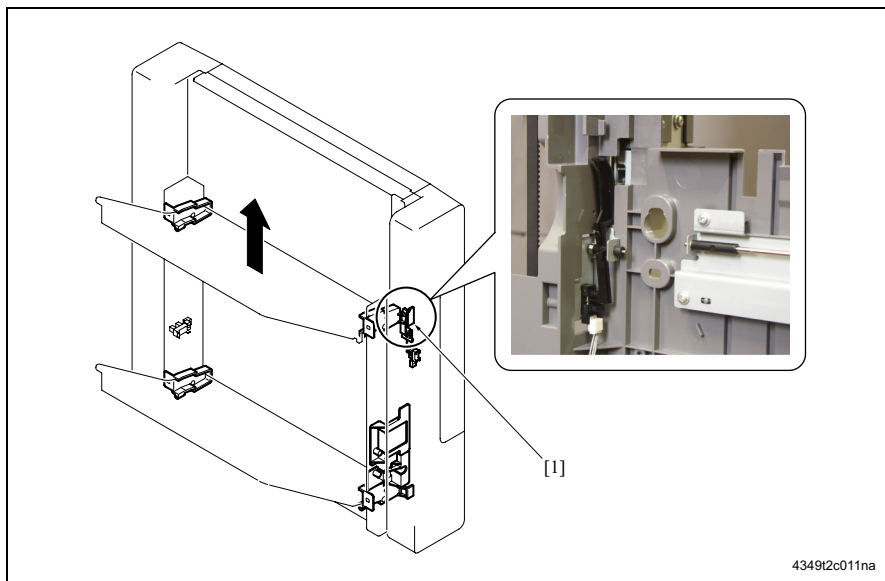
1. During the initial operation sequence, the Tray is subjected to a descent motion until the Lower Limit Sensor (PS14) is activated.



[1] Tray Position Sensor (PS3)

[2] Lower Limit Sensor (PS14)

2. After PS14 has been activated, the Up/Down Section is subjected to an ascent motion.
3. When PS3 [1] is activated a first time after the ascent motion of the Up/Down Section has been started, it is determined that the Up/Down Section is now located at the paper exit opening for the Tray /1.



[1] Tray Position Sensor (PS3)

4. When PS3 is activated a second time after the ascent motion of the Up/Down Section has been started, it is determined that the Up/Down Section is now located at the paper exit opening for the Tray /2.
5. Drive is stopped when PS3 is activated with Upper Limit Sensor (PS15) of the target tray in the activated position.

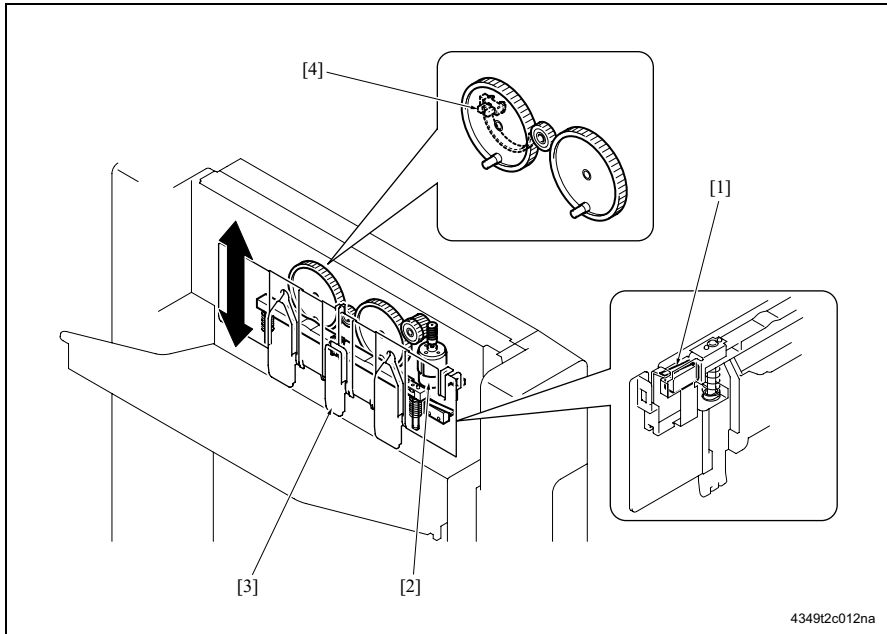
\* If OT is installed, OT is at the exit port when the position sensor is activated twice and the Tray /2 is at the exit port when the position sensor is activated three times.

## B. Paper Full Detection

- When the Tray Position Sensor (PS3) changes from the activated to deactivated state with the Upper Limit Sensor (PS15) in the activated state, a paper full condition is detected and the corresponding message will appear on the operation panel.

### 5.2.4 Shutter Open/Close Mechanism

- The paper exit section is provided with the Shutter [3] and this Shutter is normally in the up condition (the condition in which the Paper Exit Opening is opened). However, when the Tray goes up and down, the Paper Exit Opening is closed to prevent an accident such as hands getting caught in the Paper Exit Opening.
- The Shutter is opened or closed by the Shutter Motor (M12) [2] that turns a gear train for raising or lowering the Shutter.
- The Shutter Home Sensor (PS16) [4] detects the position of the gear, thereby determining the position of the Shutter.
- When the Shutter does not close while in the Tray up/down operation, the Shutter Switch (SW2) [1] turns OFF to shut off a 24V DC and stop the up/down of the Tray at once.



[1] Shutter Switch (SW2)

[2] Shutter Motor (M12)

[3] Shutter

[4] Shutter Home Sensor (PS16)



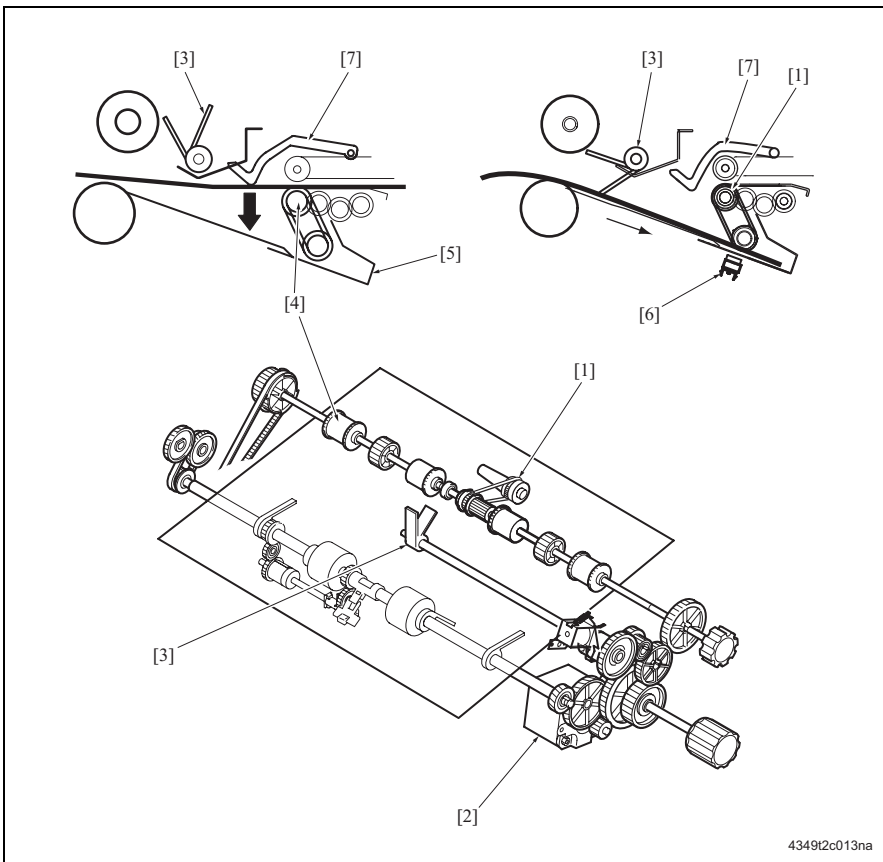
## 5.3 Stacker section

### 5.3.1 Paper aligning mechanism (sub scan direction)

- Sheets of paper are aligned properly and stapled together inside the stacker section before being fed out onto the corresponding tray.
- In the Sort, Group, Staple, or Half Fold/Fold & Staple mode, each copy set is stored in the Stacker with the Upper Exit Roller separated from the Lower Exit Roller.
- The Stacker Sensor (PS8) detects paper in the Stacker.
- The Stacker Paddle and Aligning Belt are driven when the Exit Motor (M1) is rotated in reverse.

#### A. Operation

1. The paper fed out from the main body is held downward by the Drop Lever [7] and dropped down into the Stacker by the Intermediate Conveyance Roller /2 [4].
2. The paper dropped into the Stacker is pressed against the Paper Stopper [5] by the Paddle [3] and Aligning Belt [1] so that it is aligned properly in the sub scan direction.



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[1] Aligning Belt

[2] Exit Motor (M1)

[3] Stacker Paddle

[4] Intermediate Conveyance Roller /2

[5] Paper Stopper

[6] Stacker sensor (PS8)

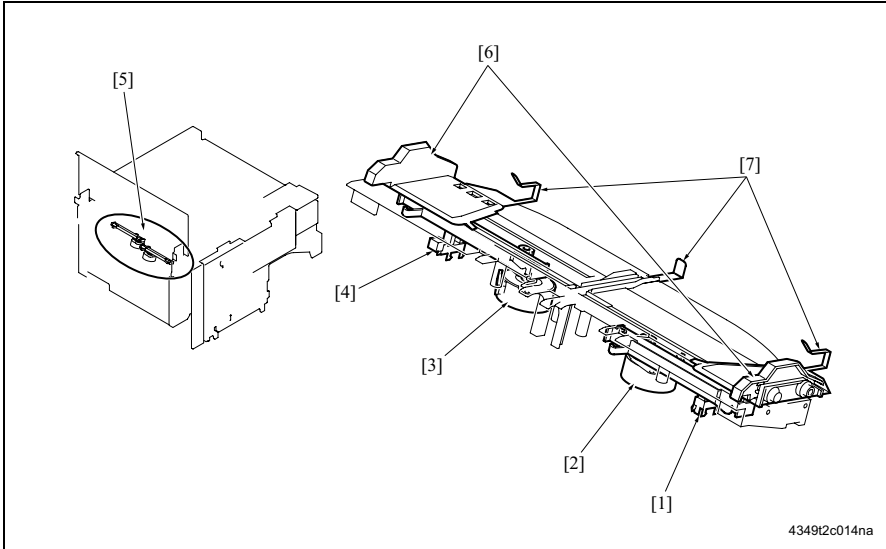
[7] Drop Lever

### 5.3.2 Paper aligning mechanism (main scan direction)

- Aligning Plates are moved and the Paddle is rotated so as to align the paper at the stapling position.
- The paper in the Stacker is aligned in the main scan direction by two Alignment Motors and aligning plates.

#### A. Aligning plates

- The aligning plates [6] are moved to the front or rear in accordance with the paper size.
- The Alignment Sensor /Rr (PS6) [4], /Fr (PS7) [1] detects the position of each aligning plate.



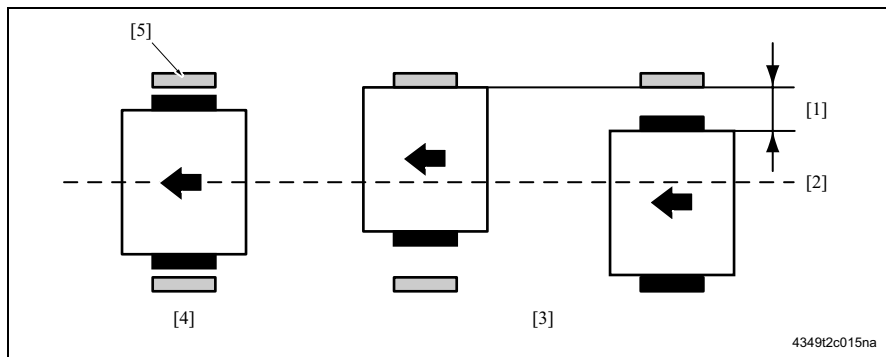
- [1] Alignment sensor /Fr (PS7)
- [2] Alignment motor /Fr (M5)
- [3] Alignment motor /Rr (M4)
- [4] Alignment sensor /Rr (PS6)

- [5] Paper Aligning Portion
- [6] Aligning Plate
- [7] Paper Stoppers

**B. Paper aligning sequence**

- In normal print and staple mode, the paper is fed into the tray at its center position.
- If no stapling is involved in the Sort or Group Print mode, the aligning plate shifts 15 mm to the front or rear from the center. This stacks papers in a saw tooth manner, each being offset by about 30 mm with respect to the others.

This shifting motion is not performed when papers are fed into the MT or the SD.



[1] 30mm

[2] Center

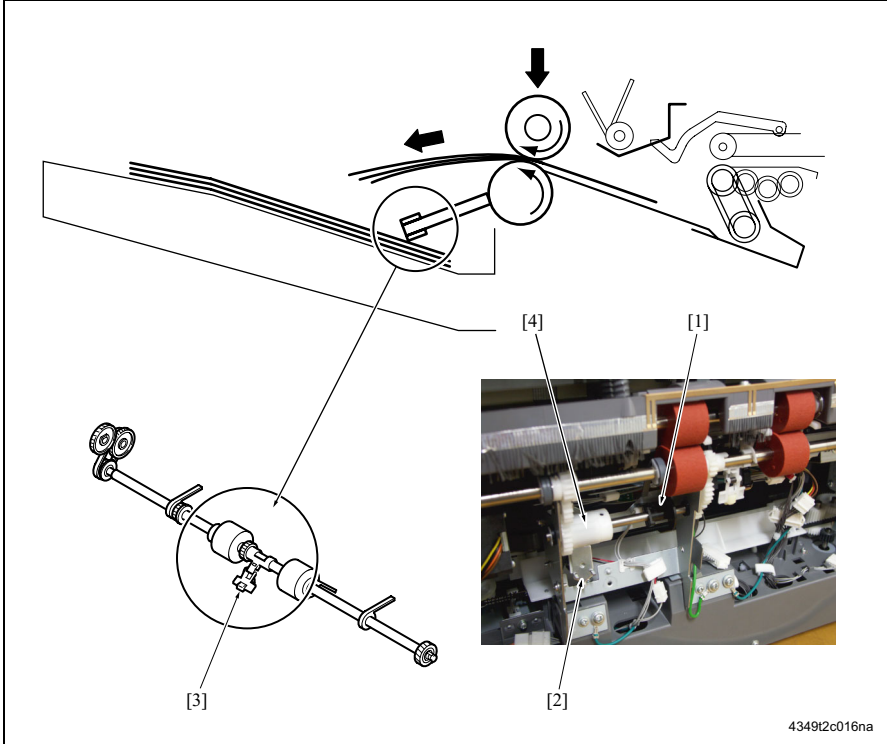
[3] Shift (Sort/Group)

[4] Normal/Staple

[5] Aligning Plate

### 5.3.3 Exit mechanism

- The paper exit roller section is provided with the Paper Holding Paddle [3] to hold the paper exited onto the Tray while in the sort mode so that the paper does not have an uneven edge.
- The subsequent copy set is fed out with the copy sets previously resident on the tray being held down by the paper holding paddle.
- The Exit Paddle Home Sensor (PS11) [1], Spring Clutch [4], and Exit Paddle Solenoid (SD2) [2] control the retracted position and paper holding position of the paper holding paddle.



[1] Exit Paddle Home Sensor (PS11)

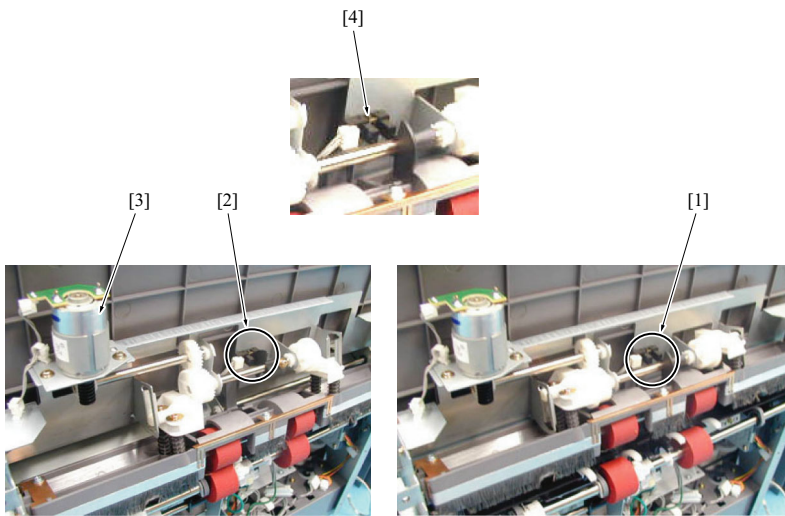
[2] Exit Paddle Solenoid (SD2)

[3] Paper Holding Paddle

[4] Spring Clutch

**A. Exit Roller up/down mechanism**

- While in the sort mode and the staple mode, the Exit Roller /Up is pressed to the Exit Roller /Lw after the paper is stacked in the Stacker.
- The press/release of the Exit Roller /Up is driven by the Exit Roller Release Motor (M6) [3].
- The Exit Roller Home Sensor (PS12) [4] detects the position of the Exit Roller /Up, whether it is in the released or pressed position.



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[1] Unblocked (Released)

[2] Blocked (Pressed)

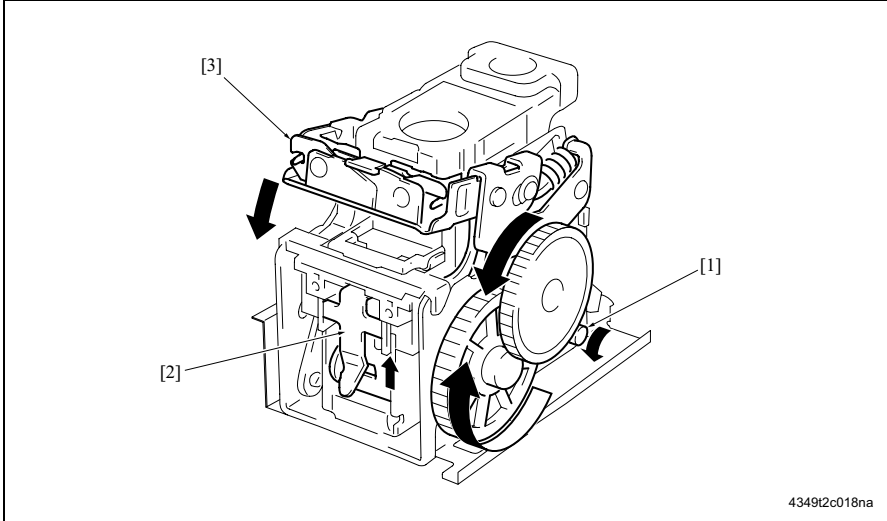
[3] Exit Roller Release Motor (M6)

[4] Exit Roller Home Sensor (PS12)

## 5.4 Stapling

### 5.4.1 Stapling mechanism

- Stapling is performed by the Stapling Unit.
- When the Stapling Motor [1] is rotated, the Clinch Arm [3] lowers. The Stapler [2] thereafter goes up to drive a staple in the paper.
- Five different types of stapling are available: parallel front one point, parallel rear one point, slant front one point, slant rear one point and parallel two points.



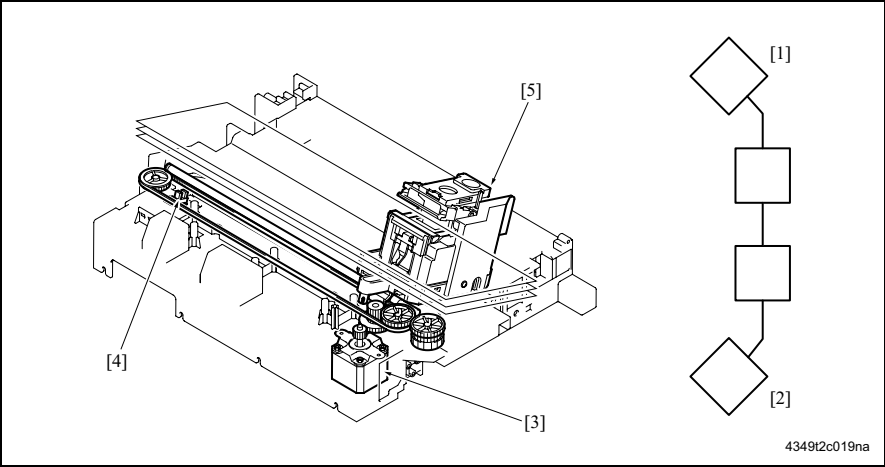
[1] Stapling Motor

[3] Clinch Arm

[2] Stapler

**5.4.2 Stapling Unit moving mechanism**

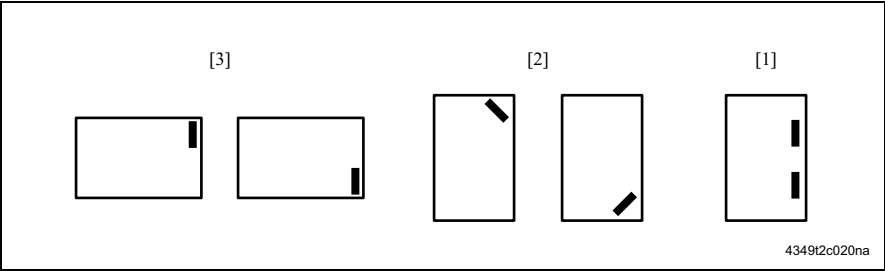
- The Stapling Unit is moved by the Stapler Movement Motor (M7) [3].
- M7 drives the belt so that the Stapling Unit is moved to the corresponding stapling position.
- The stapling stop position is controlled by the period of time during which the M7 is kept energized, as counted from the time when the Stapler Home Sensor (PS10) [4] has been activated.



- |                                 |                                |
|---------------------------------|--------------------------------|
| [1] Home                        | [4] Stapler Home Sensor (PS10) |
| [2] Staple change position      | [5] Stapling Unit              |
| [3] Stapler Movement Motor (M7) |                                |

**5.4.3 Stapling Position**

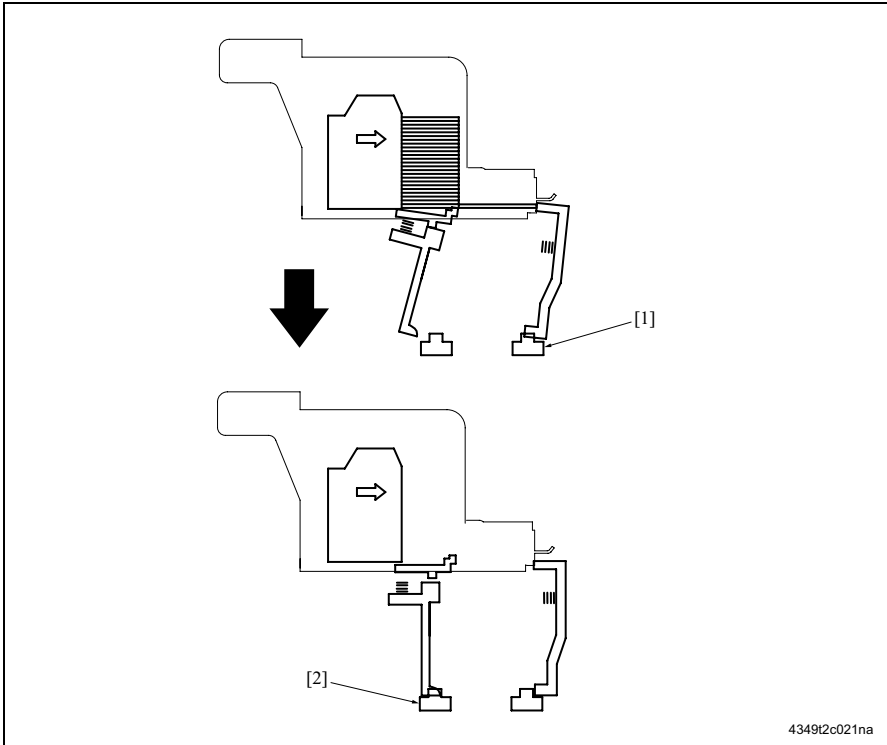
- A single stapling unit is moved to perform 2-point stapling.



- |                         |                        |
|-------------------------|------------------------|
| [1] Parallel two points | [3] Parallel one point |
| [2] Slant one point     |                        |

#### 5.4.4 Staple empty detection

- Staple Empty Sensor [2] detect whether or not there are staples still left.
- When the number of staples left in the staple cartridge becomes about 20, a staple sheet empty condition results, causing a corresponding empty message to appear on the operation panel.
- When the empty condition is detected, the corresponding empty indication is given on the operation panel. At the same time, the Stapling Unit moves to the front.
- When a new staple cartridge is loaded, the stapling motor is energized until the Stapler Ready Sensor [1] detects a staple, which results in the staple to be fed up to the stapling position.



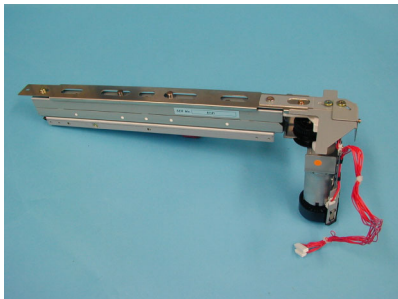
[1] Stapler Ready Sensor

[2] Staple Empty Sensor



## 6. PU-501

### 6.1 Composition

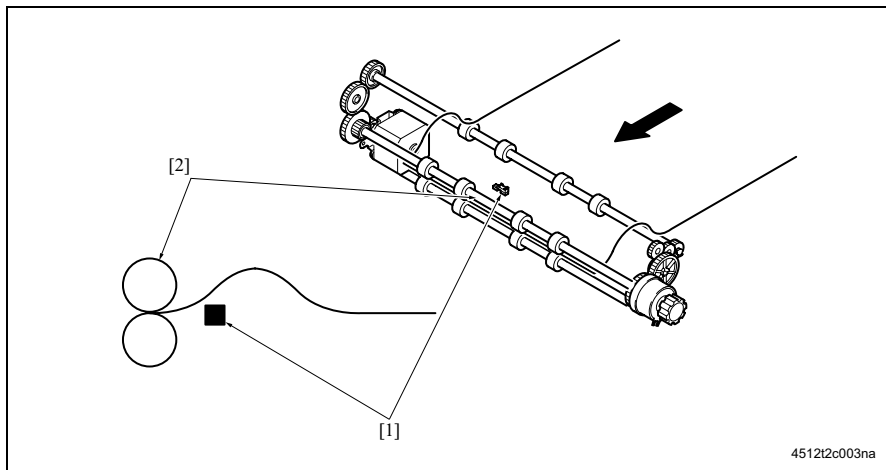


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### 6.2 Operation

#### 6.2.1 Registration mechanism

- For punch and holding operations, a loop is formed in the paper at the Registration Roller [2] to correct skew of the paper.
- The Entrance Sensor (PS4) [1] detects the leading edge of the paper and the Registration Roller forms a loop in the paper.
- The Registration Clutch (CL1) is then energized after a given period of time after the PS4 is activated by the leading edge of the paper, this causes the Registration Roller to start turning.



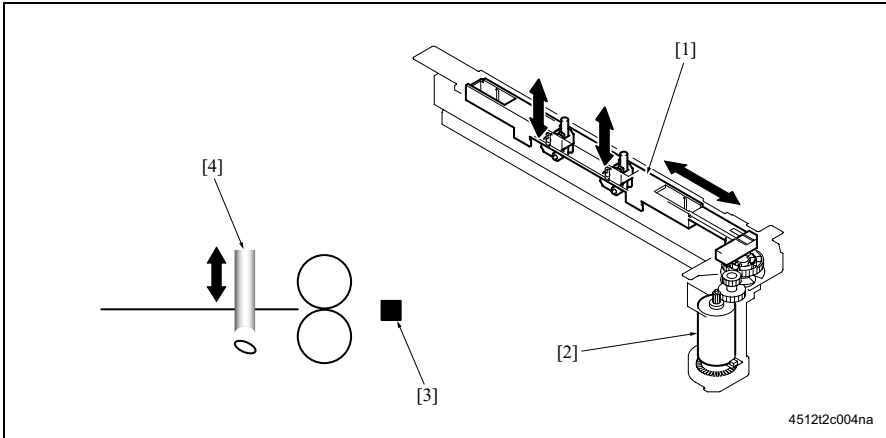
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[1] Entrance Sensor (PS4)

[2] Registration Roller

### 6.2.2 Punch mechanism

- After a given period of time after the Entrance Sensor (PS4) [3] has detected the trailing edge of the paper, the Conveyance Motor (M2) of FS is deenergized and a punch hole operation is made at the trailing edge portion in each sheet of paper.
- Punch holes are made when the slide cam [1] makes a reciprocating motion, as driven by the drive cam which is rotated by the Punch Motor (M1) [2] provided in the punch unit.



[1] Slide Cam

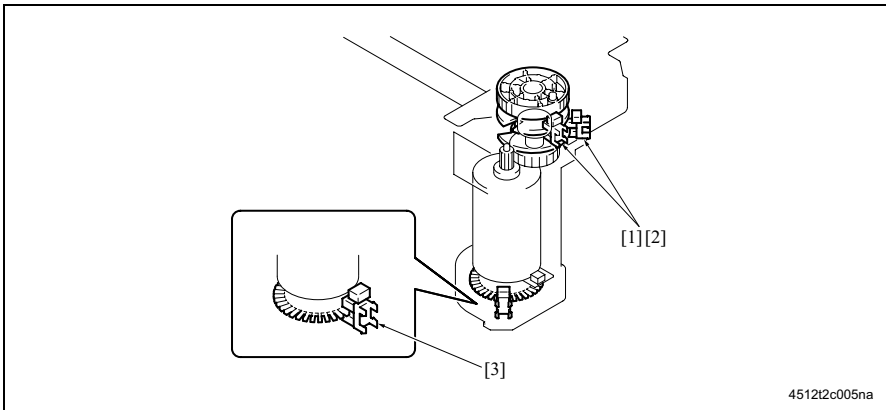
[2] Punch Motor (M1)

[3] Entrance Sensor (PS4)

[4] Puncher

### 6.2.3 Punch status detection

- The punch status is detected by using the Punch Position Sensor /1 (PS2) [1], /2 (PS3) [2] and the Encoder Sensor (PS4) [3].



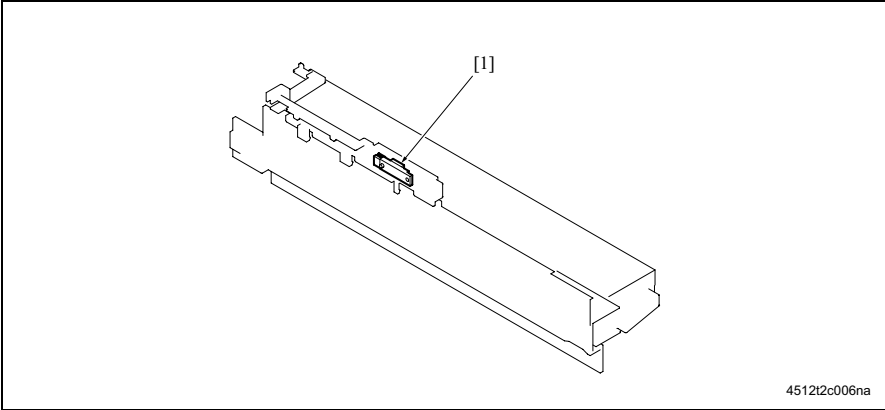
[1] Punch Position Sensor /1 (PS2)

[2] Punch Position Sensor /2 (PS3)

[3] Encoder Sensor (PS4)

#### 6.2.4 Punch Scraps Box full detection mechanism

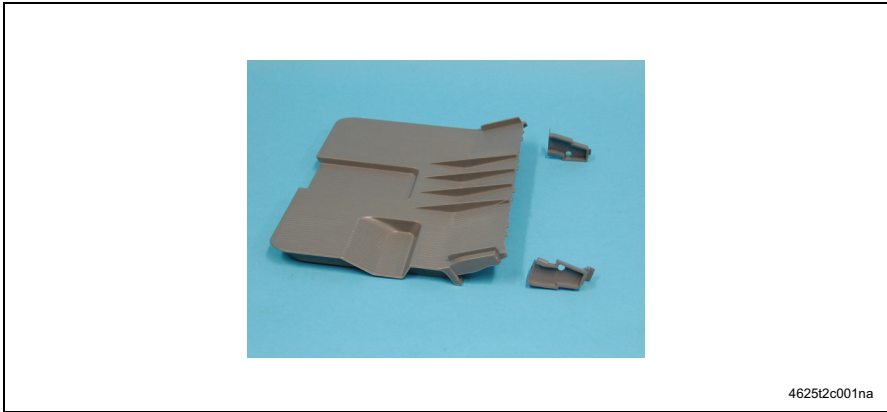
- Punch scraps produced as a result of punching operation is stored in the Punch Scraps Box.
- The Punch Scraps Box is provided with the Punch Scraps Full Sensor (PS1) [1]. When a punch waste is detected, the corresponding message is displayed on the operation panel.
- PS1 is a reflector type sensor that detects height of the punch scraps.
- PS1 also detects whether a Punch Scraps Box is loaded.



[1] Punch Scraps Full Sensor (PS1)

## 7. OT-602

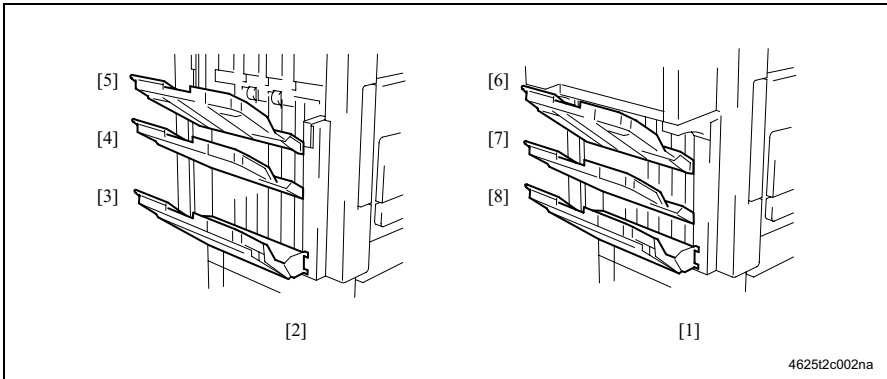
### 7.1 Composition



### 7.2 Operation

#### 7.2.1 Overview

- Mounting the optional OT provides a total of three trays.
- The OT is attached at different positions depending on whether options SD or MT is mounted or not.  
The capacity of each tray is different depending on the position of the OT is attached.
- When the short-circuit connector shipped with OT is mounted, the machine determines that OT has been mounted.



[1] When MT/SD is installed

[2] FS only

[3] 500 sheets

[4] 200 sheets

[5] 200 sheets

[6] 200 sheets

[7] 200 sheets

[8] 200 sheets

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KONICA MINOLTA

## SERVICE MANUAL

Theory of Operation

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# FS-523/RU-507

# Revision history

After publication of this service manual, the parts and mechanism may be subject to change for improvement of their performance.  
Therefore, the descriptions given in this service manual may not coincide with the actual machine.

When any change has been made to the descriptions in the service manual, a revised version will be issued with a revision mark added as required.

Revision mark:

- To indicate clearly a section revised,  is shown at the left margin of the revised section.  
The number inside  represents the number of times the revision has been made.
- To indicate clearly a page that contains the revision,  is shown near the page number of the corresponding page.  
The number inside  represents the number of times the revision has been made.

## NOTE

Revision marks shown in a page are restricted only to the latest ones with the old ones deleted.

- When a page revised in Ver. 2.0 has been changed in Ver. 3.0:  
The revision marks for Ver. 3.0 only are shown with those for Ver. 2.0 deleted.
- When a page revised in Ver. 2.0 has not been changed in Ver. 3.0:  
The revision marks for Ver. 2.0 are left as they are.

2008/05	1.0	—	Issue of the first edition
Date	Service manual Ver.	Revision mark	Descriptions of revision

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■

OUTLINE

1. PRODUCT SPECIFICATION

1.1 FS-523

A. Type

Type	Multi staple finisher
Installation	Floor-mounted type
Document alignment	Center
Consumables	Staples

B. Functions

Mode	Normal	Non-sort, sort, group, sort-staple
	Punch	Non-sort-punch, sort-punch, group-punch, sort-staple-punch

C. Type of paper

- Maximum load capacity: (80 g/m<sup>2</sup>) when loaded with paper of the same size.

(1) Straight

Type of paper	Size of paper	Weight	Max. capacity	Exit tray	Max. number of sheets stapled
Plain paper	Inch:	60 to 90 g/m <sup>2</sup>	250 sheets	Sub tray	—
Recycled paper	A3, A4, A4S				
Thick paper	11 x 17, 8½ x 14,	91 to 210 g/m <sup>2</sup>	20 sheets		
Thin paper	8½ x 11, 8½ x 11S,	50 to 59 g/m <sup>2</sup>			
OHP transparencies	8½ x 5½S, Foolscap	—			
Envelope	Metric: A3, B4, A4, A4S, B5,				
Label paper	B5S *2, A5S, B6S				
Letterhead	11 x 17, 8½ x 11, 8½ x 11S, Foolscap, 8K *1, 16K *1, 16KS *1				

\*1 Only supported in Taiwan.

\*2 Supported in other than inch area and Taiwan.

**(2) Non-sort, sort, group**

Type of paper	Size of paper	Weight	Max. capacity	Exit tray	Max. number of sheets stapled
Plain paper	Inch:	50 to 210 g/m <sup>2</sup>	3000 sheets (A4S or smaller) 1500 sheets (B4 or larger)	Main tray	—
Recycled paper	A3, A4, A4S				
Thick paper	11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S, Foolscap				
Thin paper	Metric: A3, B4, A4, A4S, B5, B5S *2 11 x 17, 8½ x 11, 8½ x 11S, Foolscap, 8K *1, 16K *1, 16KS*1				

\*1 Only supported in Taiwan.

\*2 Supported in other than inch area and Taiwan.

**(3) Sort-staple, group-staple**

Type of paper	Size of paper	Weight	Max. capacity	Exit tray	Max. number of sheets stapled
Plain paper	Inch:	60 to 90 g/m <sup>2</sup>	3000 sheets (A4S or smaller) 1500 sheets (B4 or larger)	Main tray	50 sheets
Recycled paper	A3, A4, A4S				
	11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S, Foolscap				
	Metric: A3, B4, A4, A4S, B5, B5S *2 11 x 17, 8½ x 11, 8½ x 11S, Foolscap, 8K *1, 16K *1, 16KS *1				

\*1 Only supported in Taiwan.

\*2 Supported in other than inch area and Taiwan.

**(4) Punch****a. Metric/Swedish**

Type of paper	Size of paper	Weight	Max. capacity	Exit tray	Max. number of sheets stapled
Plain paper	A3, B4, A4, A4S, B5,	60 to 90 g/m <sup>2</sup>	—	Main tray	—
Recycled paper	8K *1, 16K *1			Sub tray	

\*1 Only supported in Taiwan.

**b. Inch 2 holes**

Type of paper	Size of paper	Weight	Max. capacity	Exit tray	Max. number of sheets stapled
Plain paper	11 x 17, 8½ x 11,	60 to 90 g/m <sup>2</sup>	—	Main tray	—
Recycled paper	8½ x 11S, 8½ x 14, 5½ x 8½S, Foolscap			Sub tray	

**c. Inch 3 holes**

Type of paper	Size of paper	Weight	Max. capacity	Exit tray	Max. number of sheets stapled
Plain paper	8½ x 11, 11 x 17	60 to 90 g/m <sup>2</sup>	—	Main tray	—
Recycled paper				Sub tray	

### D. Stapling

Staple filling method	Dedicated staple cartridge (5000 staples)	
Staple detection	Available (near empty: 20 remaining staples)	
Staple position *1	Rear: Diagonal 45° 1 point	Metric: A3, B4, A4, B5
	Front: Diagonal 45° 1 point	Inch: 8½ x 11, 11 x 17
	Rear: Diagonal 28° 1 point	Metric: B4, B5
	Front: Diagonal 28° 1 point	Inch: —
	Rear: Parallel 1 point	Metric: A4S, B5S
	Front: Parallel 1 point	Inch: 8½ x 11S, 8½ x 14
	Side: 2 points	Metric: A4, A4S, A3, B5, B5S, B4 Inch: 8½ x 11, 8½ x 11S, 8½ x 14, 11 x 17
Manual staple	None	

\*1 In case of the 1-staple mode, conduct a parallel and a skew adjustment according to the length in the main scan direction.

Parallel: main scan direction 182 to 216 mm

Diagonal: main scan direction 216 to 297 mm

### E. Punch

No. of holes	Inch: 2 holes, 3 holes Metric: 4 holes
Punch scraps full detection	None

### F. Maintenance

Maintenance	Same as the main body.
-------------	------------------------

### G. Machine data

Power source	24V DC ± 10 % (supplied from the main body)
Power consumption	63 W or less
Dimensions	538 (W) x 637 (D) x 978 (H) mm
Weight	39.2 kg

### H. Operating environment

Temperature	Same as the main body.
Humidity	Same as the main body.

#### Note

- The information herein may be subject to change for improvement without notice.

1.2 RU-507


A. Type

Type	Roller method relay conveyance unit
------	-------------------------------------

B. Functions

Conveyance	Paper conveyance from the main body to FS
------------	---

C. Type of paper

Paper size	Same as the main body.
Paper type	Same as the main body.
Amount of curling (5 sheets)	<div>b = 10 mm or less</div> <div></div>

D. Maintenance

Maintenance	Same as the main body.
-------------	------------------------

E. Machine data

Power source	5.1V DC ± 5 % (supplied from main body)
Dimensions	430 (W) x 445 (D) x 445 (H) mm
Weight	Approx. 4.9 kg

F. Operating environment

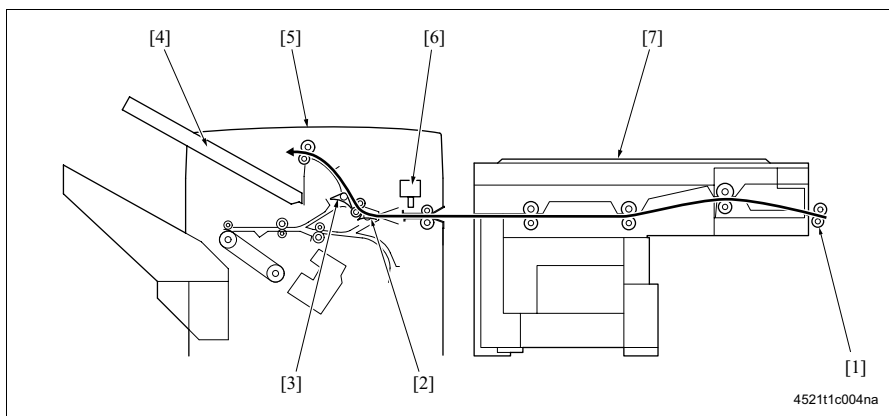
Temperature	Same as the main body.
Humidity	Same as the main body.

Note

- The information herein may be subject to change for improvement without notice.

## 2. PAPER PATH

### A. Non-sort mode (sub tray paper exit)

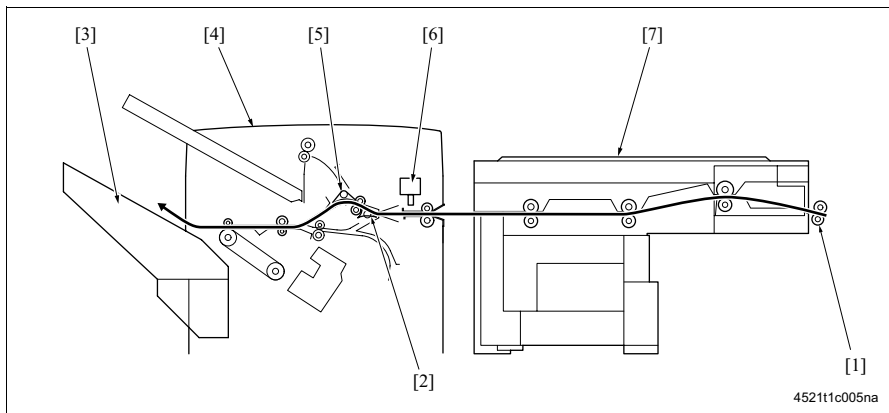


- [1] Paper exit roller (main body)
- [2] Bypass gate
- [3] Main gate
- [4] Sub tray

- [5] FS-523
- [6] Punch
- [7] RU-507

Note: Even when mixed with the punch mode, the paper path is the same.

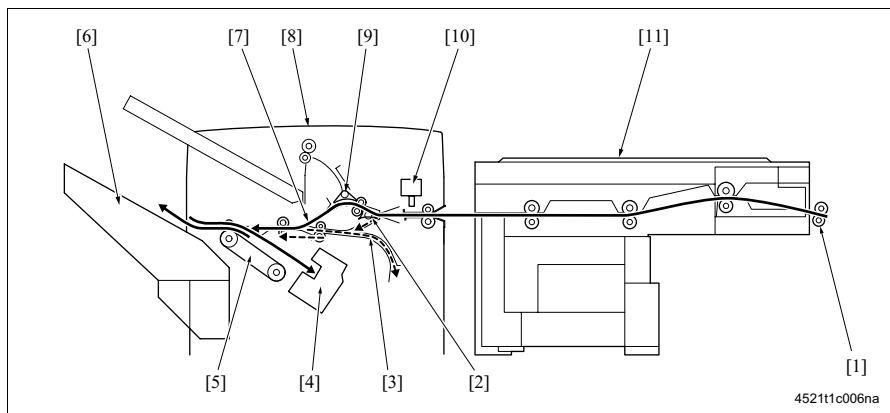
### B. Non-sort/sort/group mode



- [1] Paper exit roller (main body)
- [2] Bypass gate
- [3] Main tray
- [4] FS-523

- [5] Main gate
- [6] Punch
- [7] RU-507

Note: Even when mixed with the punch mode, the paper path is the same.

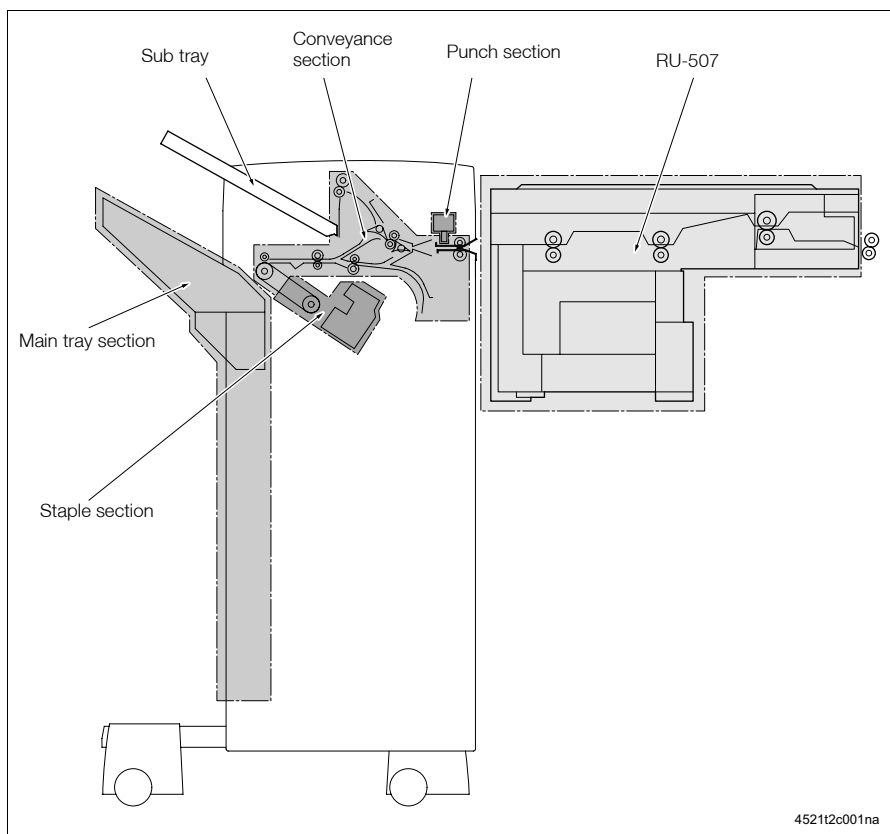
**C. Staple mode**

- |   |   |
|---|---|
| [1] Paper exit roller (main body)                                 | [7] Paper path for other than the 1st paper of the 2nd and succeeding copies. |
| [2] Bypass gate   | [8] FS-523  |
| [3] Paper path for the 1st paper of the 2nd and succeeding copies | [9] Main gate   |
| [4] Stapler   | [10] Punch  |
| [5] Handling tray   | [11] RU-507   |
| [6] Main tray   |   |

Note: Even when the A, B or C mode mentioned above is mixed with the punch mode, the paper path is the same.

## ■ COMPOSITION/OPERATION

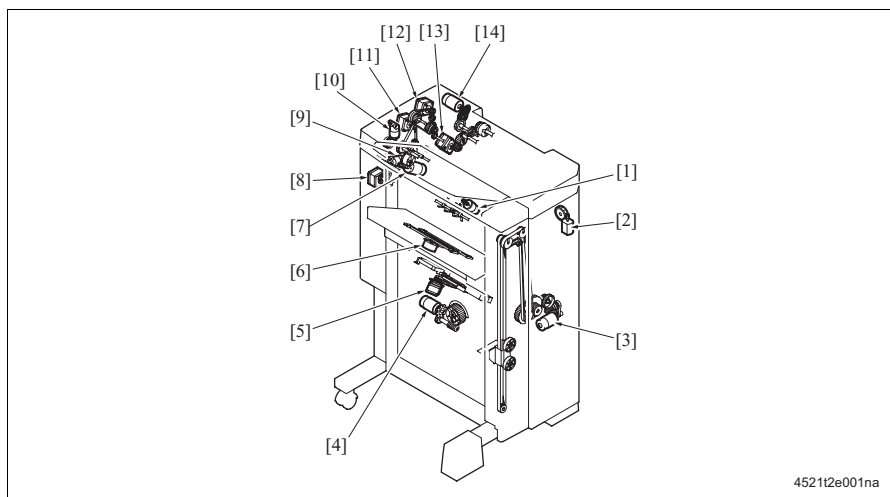
### 3. COMPOSITION





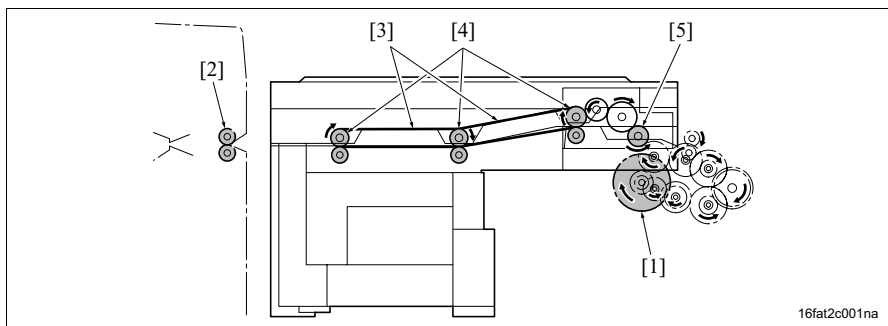
## 4. DRIVE

### 4.1 FS-523



- |  |  |
|--|--|
| [1] Paddle motor /Lw (M9)                              | [8] Paper exit motor (M3)                  |
| [2] Hole punch selector motor (M14) (for inch area)    | [9] Paddle motor /Up (M15)                 |
| [3] Tray lift motor (M7)                               | [10] Paper exit roller release motor (M13) |
| [4] Shift motor (M8)                                   | [11] Conveyance motor /Lw (M2)             |
| [5] Stapler moving motor (M6)                          | [12] Conveyance motor /Up (M4)             |
| [6] Alignment motor (M5)                               | [13] Entrance conveyance motor (M1)        |
| [7] Intermediate conveyance roller release motor (M12) | [14] Punch motor (M11)                     |

## 4.2 RU-507



- [1] Main body - fusing motor (M11)
- [2] Entrance conveyance roller (FS-523)
- [3] Belt

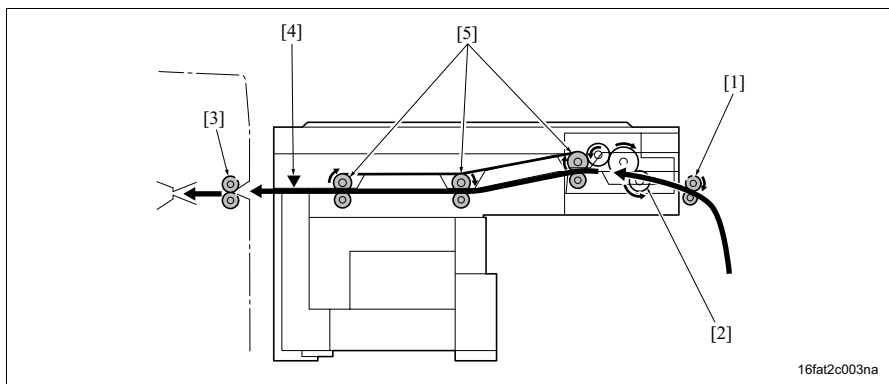
- [4] Conveyance roller
- [5] Coupling gear

## 5. OPERATION

### 5.1 RU conveyance section

#### 5.1.1 Conveyance mechanism

- The driving force from the fusing motor (M11) is transmitted through the coupling gear [2] to rotate the conveyance roller [5].
- Paper conveyed from the paper exit roller [1] on the main body side is conveyed by the conveyance roller to the entrance roller [3] on the FS side.
- A jam is detected by the path sensor (PS2) [4].



[1] Paper exit roller (main body)

[4] Path sensor (PS2)

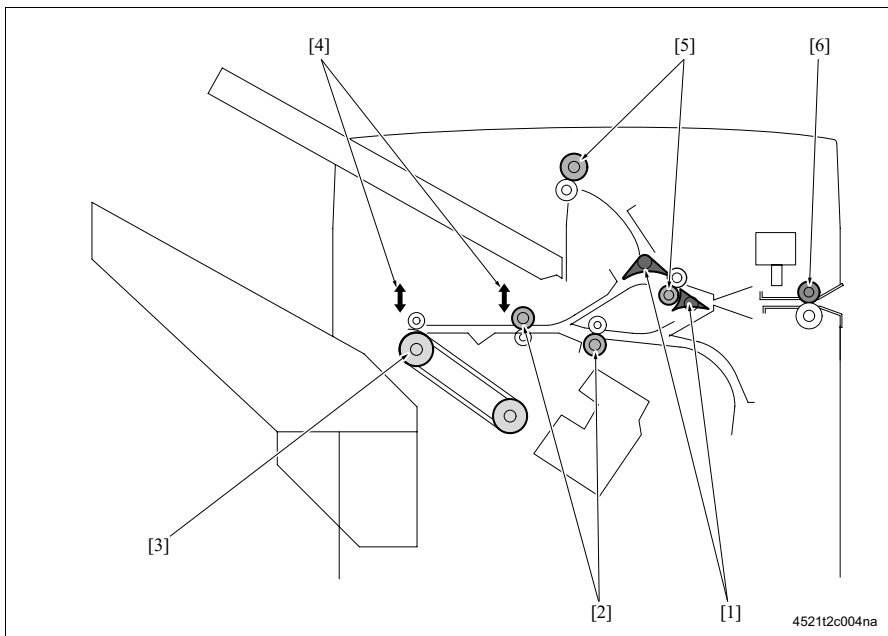
[2] Coupling gear

[5] Conveyance roller

[3] Entrance roller (FS-523)

## 5.2 FS conveyance section

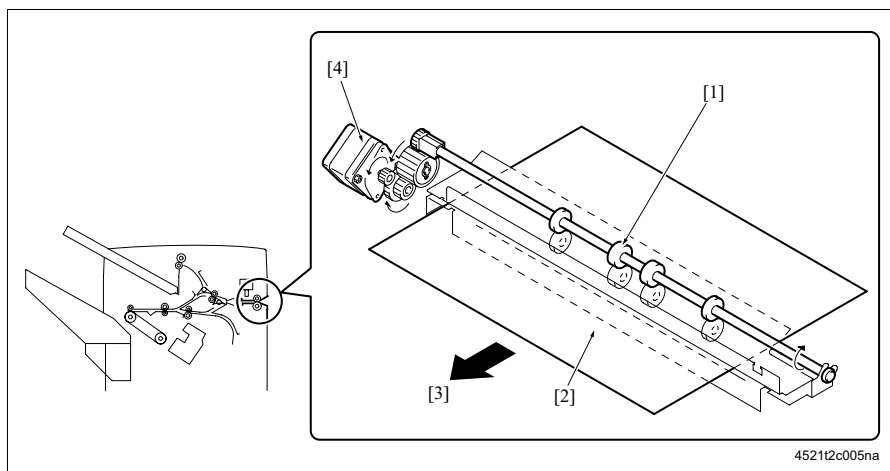
- The conveyance section is made up of the entrance conveyance mechanism [6] that conducts the conveyance drive, the main route conveyance mechanism [2], the sub tray conveyance mechanism [5], the handling/paper exit conveyance mechanism [3], the gate mechanism [1] that switches the paper path and the roller separation mechanism [4] that conducts the pressure/release of the roller.



- |  |                                   |
|--|-----------------------------------|
| [1] Gate mechanism                               | [4] Roller separation mechanism   |
| [2] Main route conveyance mechanism              | [5] Sub tray conveyance mechanism |
| [3] Main tray/handling tray conveyance mechanism | [6] Entrance conveyance mechanism |

### 5.2.1 Entrance conveyance mechanism

- The driving force of the entrance conveyance motor (M1) [4] rotates the entrance roller [1] to convey [3] paper [2] into FS.



[1] Entrance roller

[2] Paper

[3] Paper conveyance direction

[4] Entrance conveyance motor (M1)

#### A. Control

##### (1) Sub tray paper exit

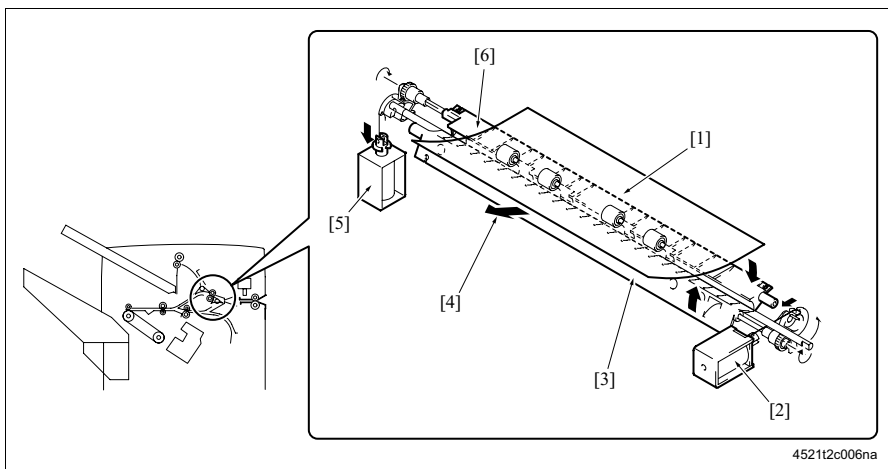
- When the FS start signal turns ON, the entrance conveyance motor (M1) turns ON. And it turns OFF a specified period of time after the sub tray exit sensor (PS1) detects the trailing edge of the last paper.

##### (2) Sort/staple

- When the FS start signal turns ON, M1 turns ON. And it turns OFF a specified period of time after the intermediate conveyance sensor (PS3) detects the trailing edge of the last paper.

### 5.2.2 Gate mechanism

- On the conveyance path, the following 2 types of gates are provided: the bypass gate [6] and the main gate [3].
- The bypass gate is driven by the bypass gate solenoid (SD1) [5].
- The main gate is driven by the main gate solenoid (SD2) [2].



[1] Paper

[2] Main gate solenoid (SD2)

[3] Main gate

[4] Paper conveyance direction when the bypass gate solenoid (SD1) turns ON and the main gate solenoid (SD2) turns ON.

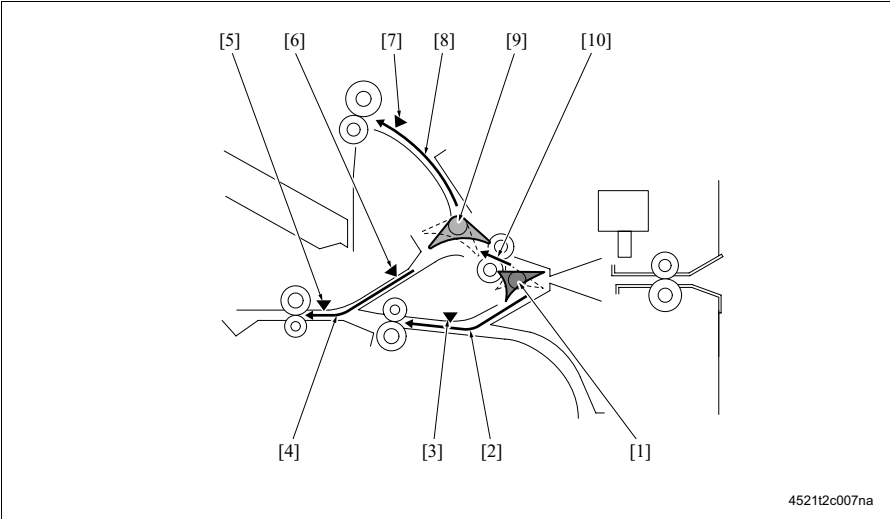
[5] Bypass gate solenoid (SD1)

[6] Bypass gate

A. Operation

- The paper conveyance path of the bypass gate [1] is switched over in the bypass route direction [2] when the bypass gate solenoid (SD1) turns OFF and switched over in the main gate direction [10] when it turns ON.
- The paper conveyance path of the main gate [9] is switched over in the main route direction [4] when the main gate solenoid (SD2) turns OFF and switched over in the sub tray route direction [8] when SD2 turns ON.
- The paper conveyance to the bypass route is used when conveying each of the 1st sheets of paper of the 2nd and succeeding copies in the staple mode to increase the handling capacity of paper even while in the stapling operation.

Conveyance path	SD1	SD2
Sub tray	ON	ON
Main tray	ON	OFF
Bypass route	OFF	—



- |  |  |
|--|--|
| [1] Bypass gate                          | [6] Main route conveyance sensor (PS4)   |
| [2] Bypass route                         | [7] Sub tray exit sensor (PS1)           |
| [3] Bypass route conveyance sensor (PS2) | [8] Sub tray route                       |
| [4] Main route                           | [9] Main gate                            |
| [5] Intermediate conveyance sensor (PS3) | [10] Main gate direction conveyance path |

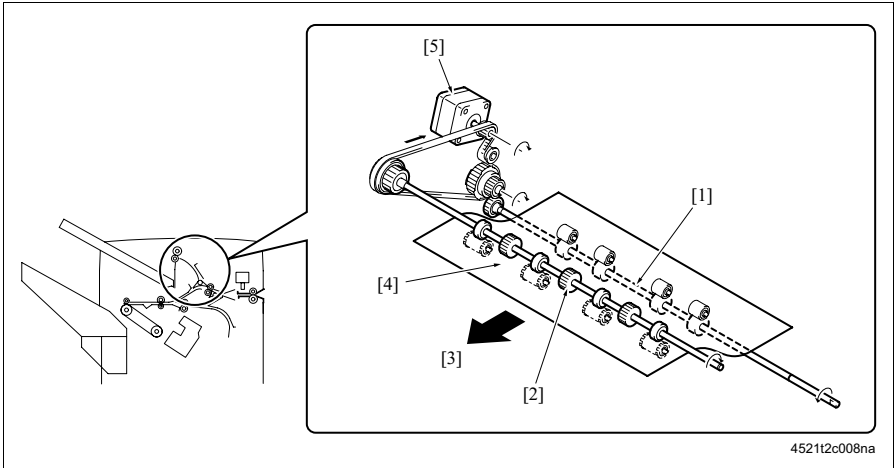
B. Control

(1) Sub tray paper exit

- A specified period of time after the fusing exit sensor (PS3) of the main body turns ON and detects the leading edge of paper, the bypass gate solenoid (SD1) turns ON and the main gate solenoid (SD2) also turns ON to switch over the conveyance path to the sub tray route.
- A specified period of time after the sub tray exit sensor (PS1) turns ON with the trailing edge of paper detected, SD1 and SD2 turn OFF.

### 5.2.3 Sub tray conveyance mechanism

- The paper conveyance to the sub tray is made while in the non-sort mode.
- The conveyance motor /Up (M4) [5] drives the conveyance roller /Up [1] and the sub tray paper exit roller [2] to convey [3] paper [4] to the sub tray.



[1] Conveyance roller /Up

[2] Sub tray paper exit roller

[3] Paper conveyance direction

[4] Paper

[5] Conveyance motor /Up (M4)

#### A. Control

##### (1) Sub tray paper exit (with no punch)

- A specified period of time after the FS start signal turns ON, the conveyance motor /Up (M4) turns ON. And it turns OFF a specified period of time after the sub tray exit sensor (PS1) turns OFF with the trailing edge of paper detected.

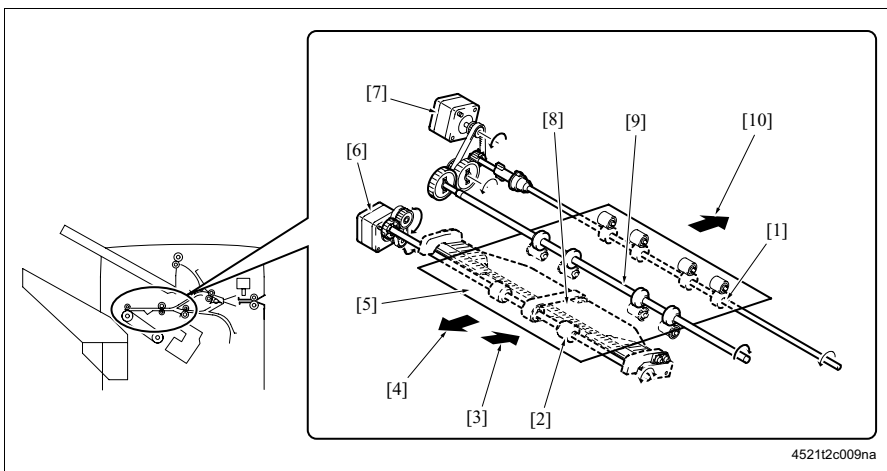
##### (2) Sub tray paper exit (punch mode)

- When the FS start signal turns ON, M4 turns ON. However it stops while in the punch operation. M4 turns ON again after completion of the punch and it turns OFF a specified period of time after PS1 turns OFF.



### 5.2.4 Main tray/handling tray conveyance mechanism

- The conveyance motor /Lw (M2) [7] drives the conveyance roller /Lw [1] and the intermediate conveyance roller [9] to convey paper in the main tray direction [4]. When rotating M2 in the reverse direction, paper is switched back [10].
- The switch back is made for the 1st paper of each of the 2nd and succeeding copies when printing continuously 2 or more copies in the staple mode to convey the 1st and the 2nd sheets of paper overlapped each other.
- The paper exit motor (M3) [6] drives the paper exit roller [2] to convey paper in the main tray direction. When rotating M3 in the reverse direction, paper is conveyed [3] to the handling tray [8].
- The paper conveyance to the handling tray is made while in the staple mode.

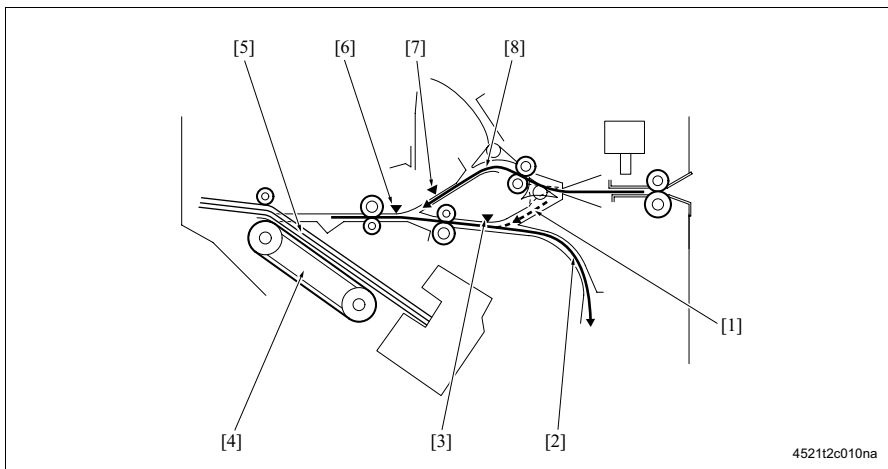


- [1] Conveyance roller /Lw
- [2] Paper exit roller
- [3] Conveyance to the handling tray
- [4] Main tray paper exit direction
- [5] Paper

- [6] Paper exit motor (M3)
- [7] Conveyance motor /Lw (M2)
- [8] Handling tray
- [9] Intermediate conveyance roller
- [10] Switch back direction

**A. Switch back control**

1. When the FS start signal turns ON, the conveyance motor /Lw (M2) rotates in the normal direction. And when the bypass route conveyance sensor (PS2) [3] detects the trailing edge of the 1st paper [1] of the 2nd copy that has been conveyed to the bypass route, M2 turns OFF.
2. A specified period of time after M2 turns OFF, M2 rotates in the reverse direction to switch back the conveyance [2]. And a specified period of time after that, M2 stops to stand by for the 2nd paper.
3. A specified period of time after the main route conveyance sensor (PS4) [7] detects the leading edge of the 2nd paper [8] that has been conveyed through the main route by the conveyance motor /Up (M4), M2 rotates again in the normal direction to convey the 1st and the 2nd sheets of paper overlapped each other.
4. A specified period of time after the intermediate conveyance sensor (PS3) [6] detects the trailing edge of the last paper, M2 turns OFF.



- |  |  |
|--|--|
| [1] 1st paper of the 2nd copy            | [5] Paper of the 1st copy                |
| [2] Switch back                          | [6] Intermediate conveyance sensor (PS3) |
| [3] Bypass route conveyance sensor (PS2) | [7] Main route conveyance sensor (PS4)   |
| [4] Handling tray                        | [8] 2nd paper of the 2nd copy            |

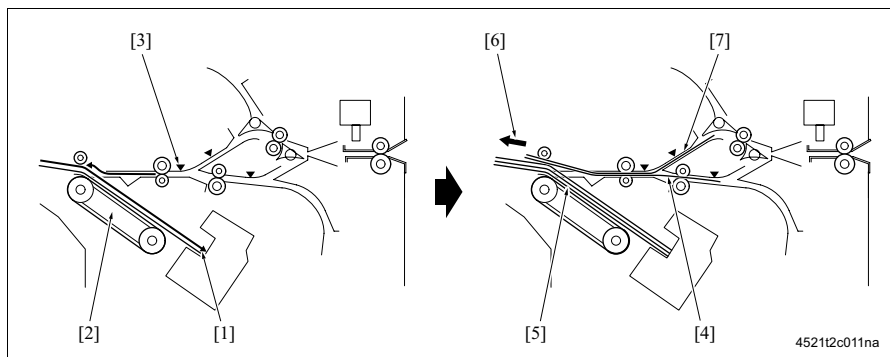
### B. Handling tray conveyance operation

### (1) Sort mode

- When the FS start signal turns ON, the paper exit motor (M3) rotates in the normal direction to convey paper to the main tray. M3 turns OFF a specified period of time after the intermediate conveyance sensor (PS3) detects the trailing edge of the last paper.

## (2) Staple mode

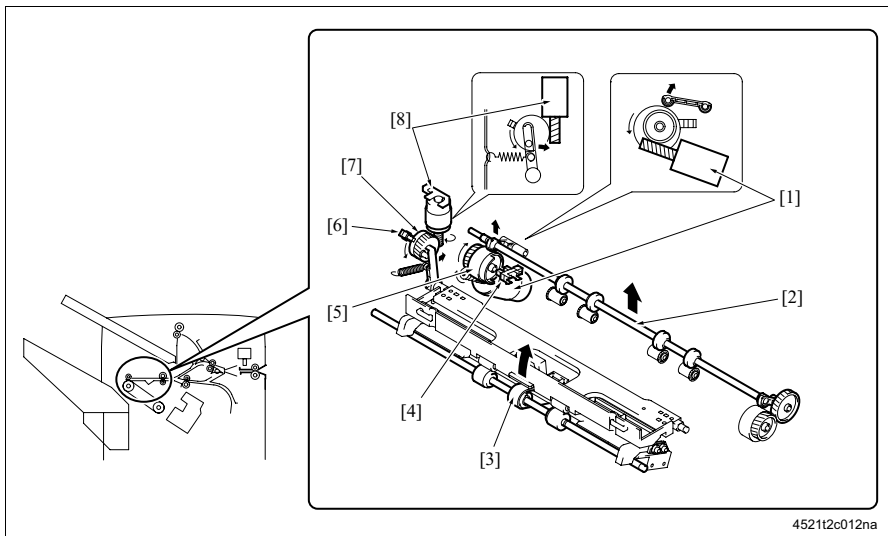
- When the FS start signal turns ON, M3 rotates in the normal direction. It stops a specified period of time after PS3 [3] detects the trailing edge of paper.
- A specified period of time after the stop, M3 rotates in the reverse direction to convey [1] paper to the handling tray [2].
- After completion of the stapling operation, M3 rotates in the normal direction to exit [6] the stapled paper [5] to the main tray. At this time, the 1st [4] and the 2nd [7] sheets of paper of the next copy are also conveyed to the main tray simultaneously.
- A specified period of time after PS3 detects the trailing edge of the 1st and the 2nd sheets of paper of the next copy, M3 stops and rotates again in the reverse direction to convey paper to the handling tray.



- |  |                                 |
|--|---------------------------------|
| [1] Paper stack                          | [5] Paper that has been stapled |
| [2] Handling tray                        | [6] Paper exit to main tray     |
| [3] Intermediate conveyance sensor (PS3) | [7] 2nd paper of the next copy  |
| [4] 1st paper of the next copy           |                                 |

### 5.2.5 Roller separation mechanism

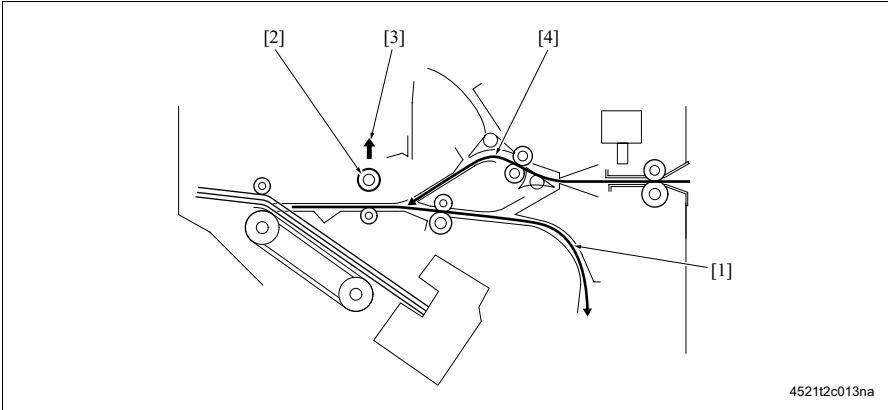
- The intermediate conveyance roller and the paper exit roller are provided with a separation mechanism that releases the pressure from the roller.
- The intermediate conveyance roller release motor (M12) [1] drives the cam [5] to pressure/release the intermediate conveyance roller [2]. The home position is detected by the roller release home sensor (PS12) [4].
- The paper exit roller release motor (M13) [8] drives the crank [7] to pressure/release the paper exit roller [3]. The home position is detected by the paper exit roller home sensor (PS13) [6].



- |  |   |
|--|---|
| [1] Intermediate conveyance roller release motor (M12) | [5] Cam                                   |
| [2] Intermediate conveyance roller                     | [6] Paper exit roller home sensor (PS13)  |
| [3] Paper exit roller                                  | [7] Crank                                 |
| [4] Roller release home sensor (PS12)                  | [8] Paper exit roller release motor (M13) |

**A. Intermediate conveyance roller separation control**

1. When printing continuously a large size paper (217 mm or larger) in the staple mode, the leading edge of the 2nd paper [4] gets to the intermediate conveyance roller [2] while in the switch back [1] of the 1st paper of the 2nd and succeeding copies. To prevent this, release the pressure of the intermediate conveyance roller and separate [3] the roller to get the 2 sheets of paper overlapped each other.
2. When the 2nd paper stops, the intermediate conveyance roller is pressured to convey the 2 sheets of paper overlapped each other to the handling tray.



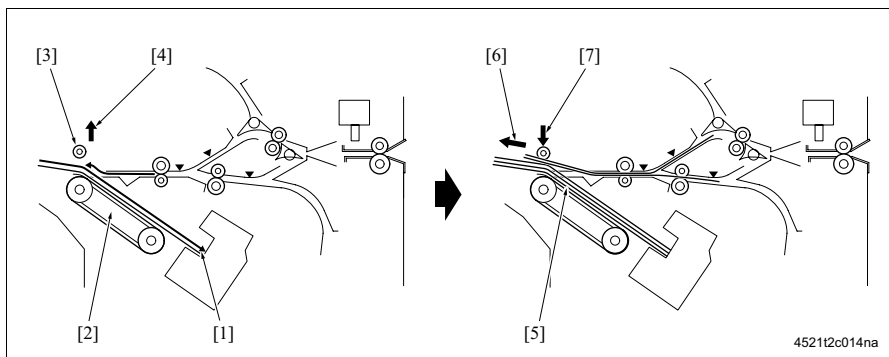
4521t2c013na

- [1] 1st paper of the 2nd copy  
 [2] Intermediate conveyance roller

- [3] Separation  
 [4] 2nd paper of the 2nd copy

**B. Paper exit roller separation control**

1. To stack [1] paper in the handling tray [2] while in the staple mode, FS start signal turns ON, and the paper exit roller release motor (M13) turns ON. After the pressure of the paper exit roller [3] is released and the paper exit roller is separated [4], M13 turns OFF.
2. After completion of the stapling operation, M13 turns ON again when the fusing exit sensor (PS3) of the main body detects the trailing edge of the 2nd paper of the next copy. M13 pressures [7] the paper exit roller to nip the paper [5], then M13 stops and the paper exits.



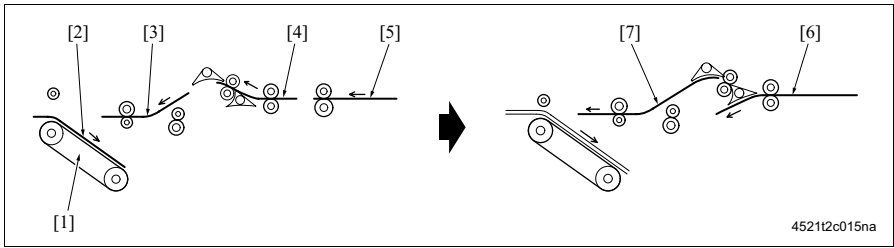
- [1] Conveyance to the handling tray
- [2] Handling tray
- [3] Paper exit roller
- [4] Release the pressure of the paper exit roller

- [5] Paper
- [6] Paper exit
- [7] Pressure

5.2.6 Conveyance operation

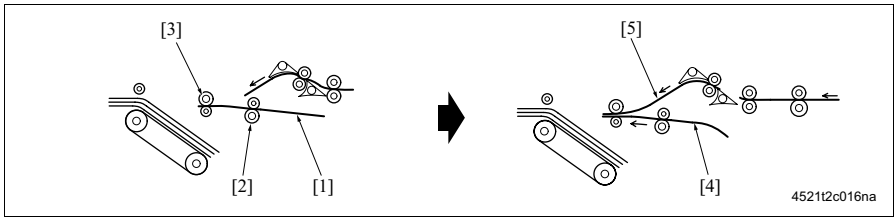
A. Continuous copy in the staple mode (in case of A4S, 3 originals, and 2 copies)

1. The 1st paper [2], the 2nd paper [3] and the 3rd paper [4] of the 1st copy are conveyed to the handling tray [1].
2. While in the conveyance of the last paper [7] of the 1st copy, the 1st paper of the 2nd copy is conveyed [6] to the bypass route.



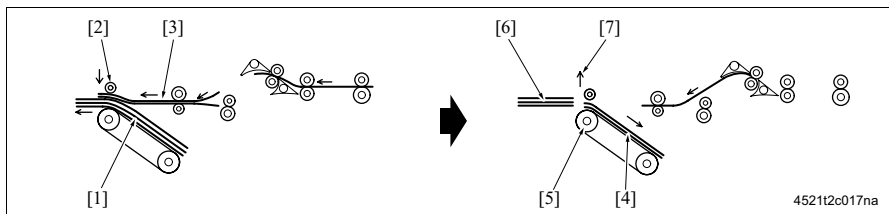
- |                               |                               |
|-------------------------------|-------------------------------|
| [1] Handling tray             | [5] 1st paper of the 2nd copy |
| [2] 1st paper of the 1st copy | [6] 1st paper of the 2nd copy |
| [3] 2nd paper of the 1st copy | [7] 3rd paper of the 1st copy |
| [4] 3rd paper of the 1st copy |                               |

3. The 1st paper [1] of the 2nd copy thus conveyed to the bypass route is switched back by the conveyance roller /Lw [2] and the storage roller [3], and then it stops.
4. The 1st paper [4] of the 2nd copy is overlapped with the 2nd paper [5] of the 2nd copy to be conveyed.



- |                               |                               |
|-------------------------------|-------------------------------|
| [1] 1st paper of the 2nd copy | [4] 1st paper of the 2nd copy |
| [2] Conveyance roller /Lw     | [5] 2nd paper of the 2nd copy |
| [3] Storage roller            |                               |

5. After completion of the stapling operation of the paper [1] of the 1st copy, the paper exit roller [2] is pressured to exit the paper of the 1st copy. At this time, the moment the paper of the 1st copy is exited, the 1st and the 2nd sheets of paper [3] of the 2nd copy are also conveyed in the main tray direction.
6. After completion of the exit of the paper [6] of the 1st copy, the pressure of the paper exit roller is released [7] and the paper exit roller [5] rotates in the reverse direction to convey the 1st and the 2nd sheets of paper [4] of the 2nd copy to the handling tray.



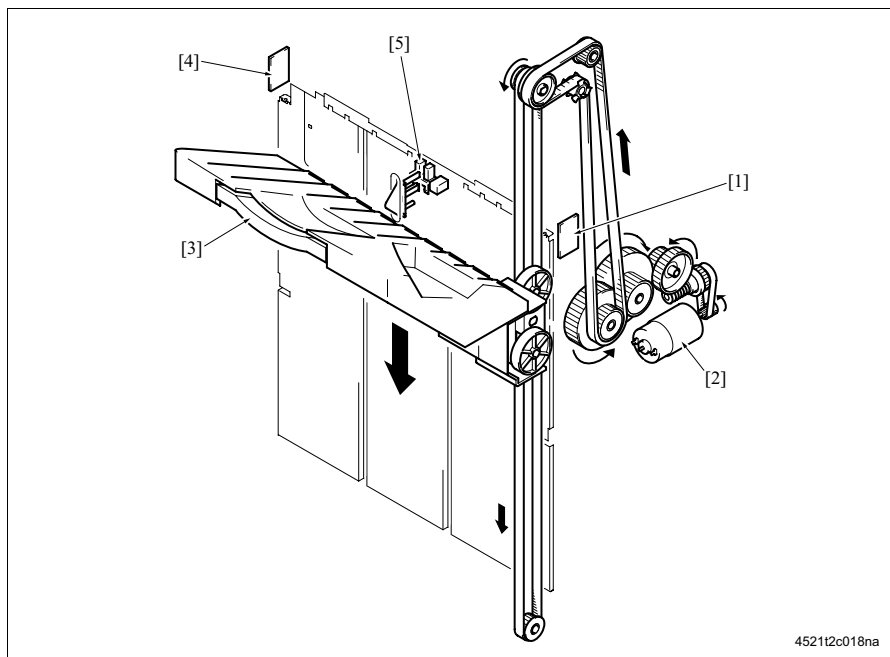
- |   |   |
|---|---|
| [1] Paper of the 1st copy                           | [4] 1st and the 2nd sheets of paper of the 2nd copy |
| [2] Pressure the paper exit roller                  | [5] Paper exit roller                               |
| [3] 1st and the 2nd sheets of paper of the 2nd copy | [6] Paper of the 1st copy                           |
|   | [7] Separation of the paper exit roller             |



## 5.3 Main tray section

### 5.3.1 Main tray up/down mechanism

- The up/down of the main tray is made by the normal/reverse rotation of the tray lift motor (M7) [2].



- |                                       |   |
|---------------------------------------|---|
| [1] Main tray upper limit LED (LED19) | [4] Main tray upper limit sensor (PS19) |
| [2] Tray lift motor (M7)              | [5] Main tray reset sensor (PS8)        |
| [3] Main tray                         |   |

#### A. Control

##### (1) While in the print operation

- While in the paper exit, when the main tray upper limit sensor (PS19) turns ON, the tray lift motor (M7) rotates in the reverse direction to bring down the main tray. And M7 turns OFF when PS19 turns OFF. This operation is repeated and stopped when the tray gets to the bottom according to the amount of paper exited.

##### (2) Paper removal control

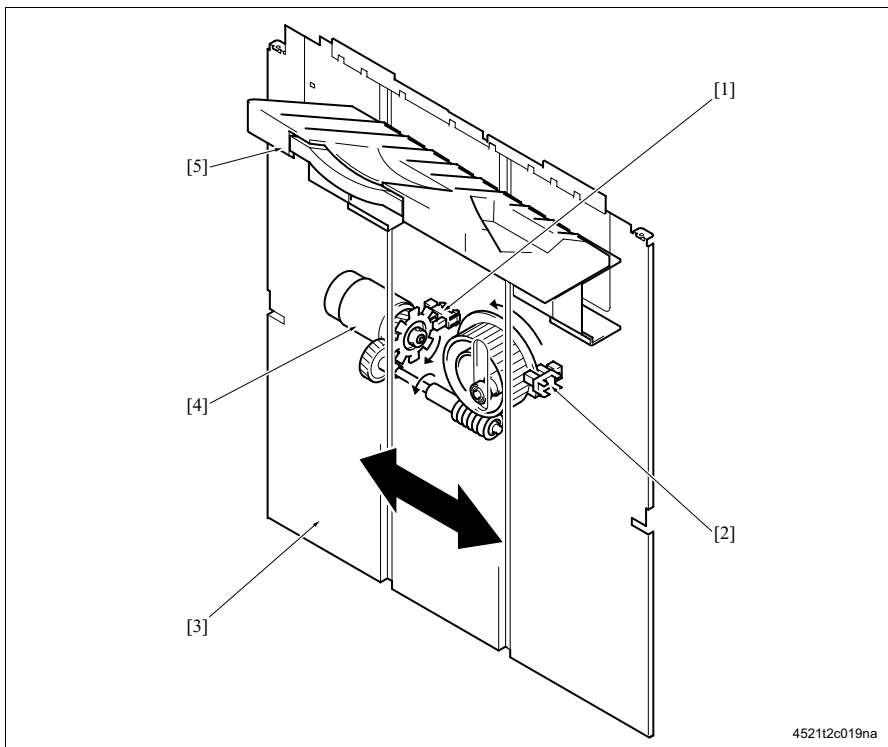
- When paper loaded on the main tray is removed with the main tray reset sensor (PS8) OFF, M7 rotates in the normal direction to bring up the main tray, and when PS8 turns ON, M7 turns OFF.

##### (3) Paper full detection

- For the main tray, when the main tray full sensor (PS7) turns ON, this is detected as the tray being full of paper and M7 turns OFF.
- When the main tray goes up and the current of M7 is in excess of a prescribed value, this is detected as the tray being full of paper and M7 turns OFF.

### 5.3.2 Main tray shift mechanism

- While in the sort/group mode, the shift motor (M8) [4] is driven to shift the main tray [5] 30 mm in the main scan direction through the shift plate [3].
- The home position is detected by the shift home sensor (PS10) [2].



[1] Shift encoder sensor (PS11)

[4] Shift motor (M8)

[2] Shift home sensor (PS10)

[5] Main tray

[3] Shift plate

#### A. Control

##### (1) Sort mode

- A specified period of time after the intermediate conveyance sensor (PS3) detects the trailing edge of the last paper of the copy, the shift motor (M8) turns ON to start the shift operation, and when the shift home sensor (PS10) detects the shift position, M8 turn OFF.

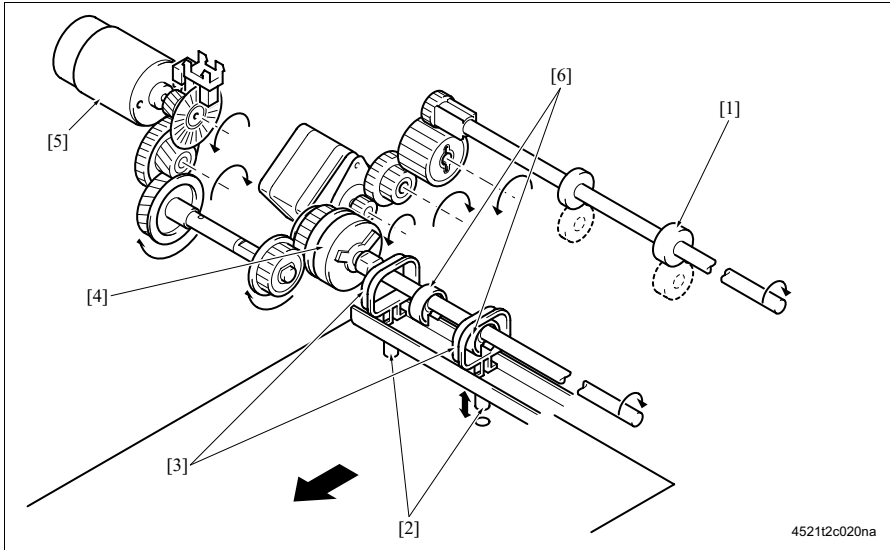
##### (2) Staple mode

- A specified period of time after the paper exit roller release motor (M13) turns ON to start the pressure operation, M8 turns ON to start the shift operation, and when PS10 detects the shift position, M8 turns OFF.

## 5.4 Punch section

### 5.4.1 Punch mechanism

- For the punch, a hole is punched on the rear side of paper for each paper.
- The driving force from the punch motor (M11) [5] is transmitted to the eccentric cam [6] by the punch clutch (CL1) [4]. And when the eccentric cam makes a full turn, the cam holder [3] makes a round trip to punch a hole.
- The position of the reciprocating operation of the punch is detected by the punch encoder sensor (PS15).



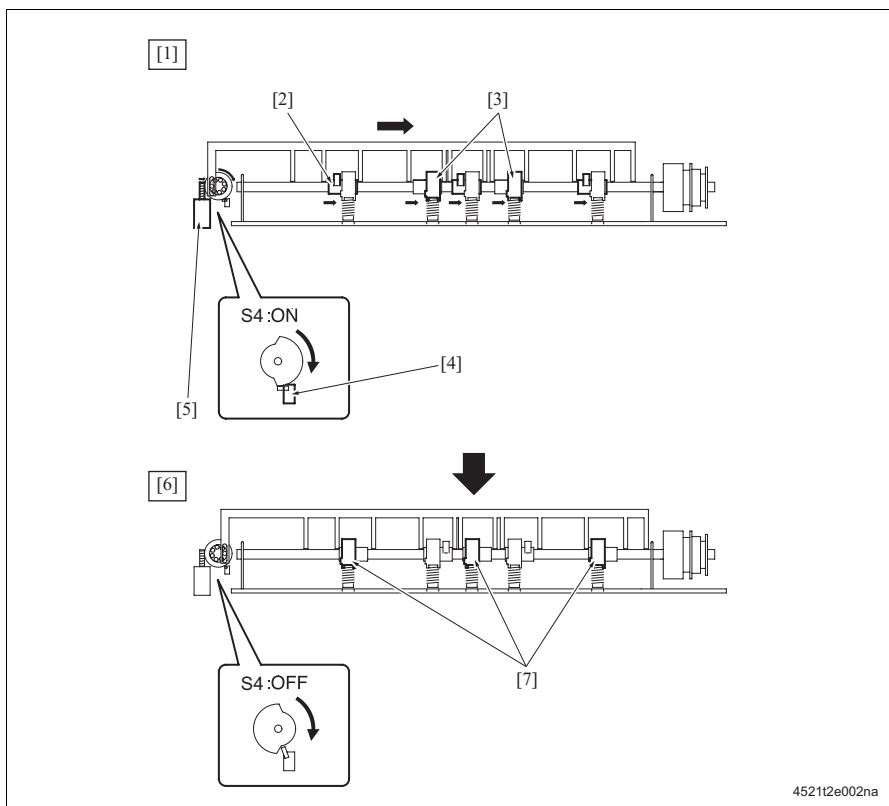
- |                     |                        |
|---------------------|------------------------|
| [1] Entrance roller | [4] Punch clutch (CL1) |
| [2] Punch blade     | [5] Punch motor (M11)  |
| [3] Cam holder      | [6] Eccentric cam      |

### A. Operation

1. A specified period of time after the path sensor (PS2) of the RU detects the trailing edge of paper, the conveyance motor /Up (M4) or conveyance motor /Lw (M2) turns OFF to stop at the prescribed punch position.
2. The punch clutch (CL1) turns ON to punch a hole.
3. M4 or M2 turns ON to convey paper.

#### 5.4.2 Punch hole switchover mechanism (for inch area)

- The hole punch selector motor (M14) [5] and the hole punch position switch (SW4) [4] are employed to move the lock holder [2] as necessary to select the hole positions (2 or 3 holes [1][6]).



[1] 2 holes

[2] Lock holder

[3] Punch bars in locked position

[4] Hole punch position switch (SW4)

[5] Hole punch selector motor (M14)

[6] 3 holes

[7] Punch bars in locked position

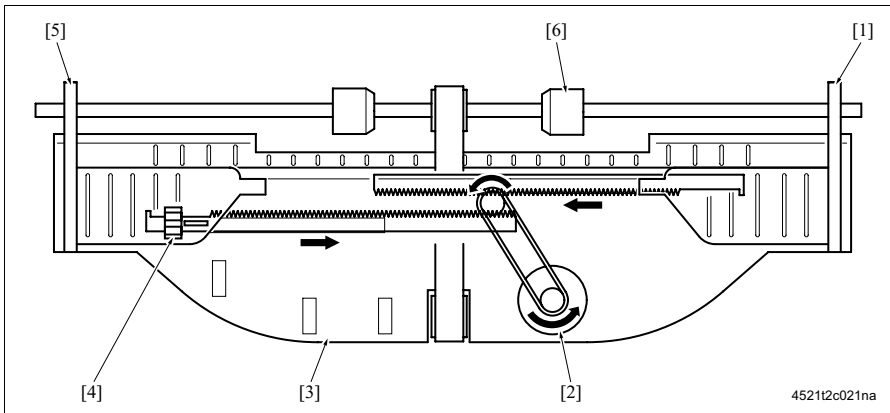
## 5.5 Staple section

### 5.5.1 Alignment mechanism

- While in the staple mode, paper is conveyed to the handling tray for alignment operation.
- The alignment in the main scan direction is made by the movement of the alignment plate, and the alignment in the sub scan direction is made by the rotation of the paddle.

#### A. Alignment plate

- The movement of the alignment plates /Fr [5] and /Rr [1] is made by the normal/reverse drive of the alignment motor (M5) [2].
- The alignment plates /Fr and /Rr move with the position at the center of paper as a reference and the home position is detected by the alignment home sensor (PS9) [4].
- The distance of movement of the alignment plate is variable according to the paper size.
- The alignment operation is made each time paper is conveyed to the handling tray.



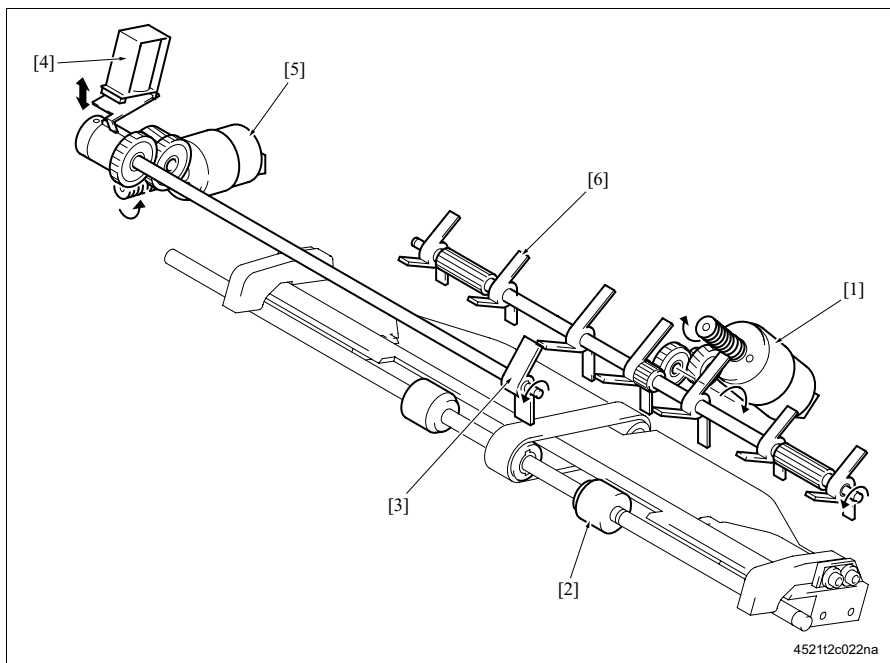
- |                          |                                 |
|--------------------------|---------------------------------|
| [1] Alignment plate /Rr  | [4] Alignment home sensor (PS9) |
| [2] Alignment motor (M5) | [5] Alignment plate /Fr         |
| [3] Handling tray        | [6] Paper exit roller           |

#### (1) Control

1. When the intermediate conveyance sensor (PS3) detects the leading edge of the 1st paper of the job, M5 rotates in the normal direction to conduct a size movement.
2. A specified period of time after PS3 detects the trailing edge of paper, M5 rotates in the normal direction to conduct the paper alignment. And it rotates in the reverse direction to return to the size standby position.

**B. Paddle**

- The paddle /Up [3] and /Lw [6] hit paper against the stopper to conduct the alignment in the sub scan direction.
- The drive of the paddle /Up is made by the paddle motor /Up (M15) [5] and the paddle solenoid (SD3) [4].
- The drive of the paddle /Lw is made by the paddle motor /Lw (M9) [1].



- [1] Paddle motor /Lw (M9)  
 [2] Paper exit roller  
 [3] Paddle /Up

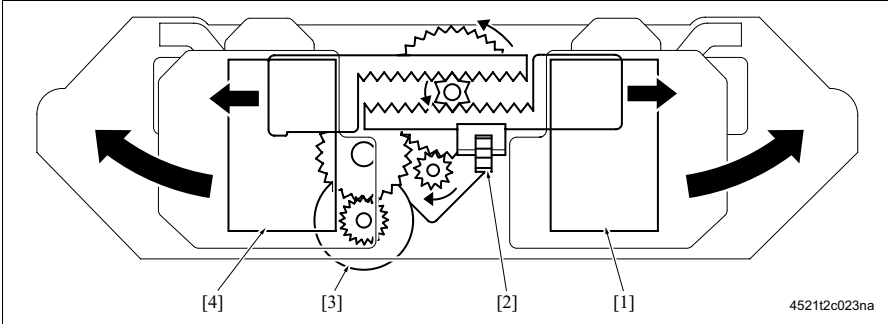
- [4] Paddle solenoid (SD3)  
 [5] Paddle motor /Up (M15)  
 [6] Paddle /Lw

**(1) Control**

1. When the FS start signal turns ON, M15 and M9 also turn ON.
2. A specified period of time after the intermediate conveyance sensor (PS3) detects the leading edge of paper, SD3 turns ON while a specified period of time.
3. A specified period of time after PS3 detects the trailing edge of the last paper of the copy, M15 and M9 turn OFF.
4. In case of the last copy, the moment the paper exit motor (M3) turns OFF, M15 and M9 turn OFF.

### 5.5.2 Stapler movement mechanism

- The movement/rotation of the staplers /Fr [4] and /Rr [1] are made by the stapler moving motor (M6) [3].
- The home position is detected by the stapler home sensor (PS14) [2] and the position is decided according to the drive amount of M6.
- The 1 stapling at the front corner is made by the stapler /Fr, the 1 stapling at the rear corner made by the stapler /Rr, and the 2 stapling operations are made by the staplers /Fr and /Rr.



[1] Stapler /Rr

[3] Stapler moving motor (M6)

[2] PS14

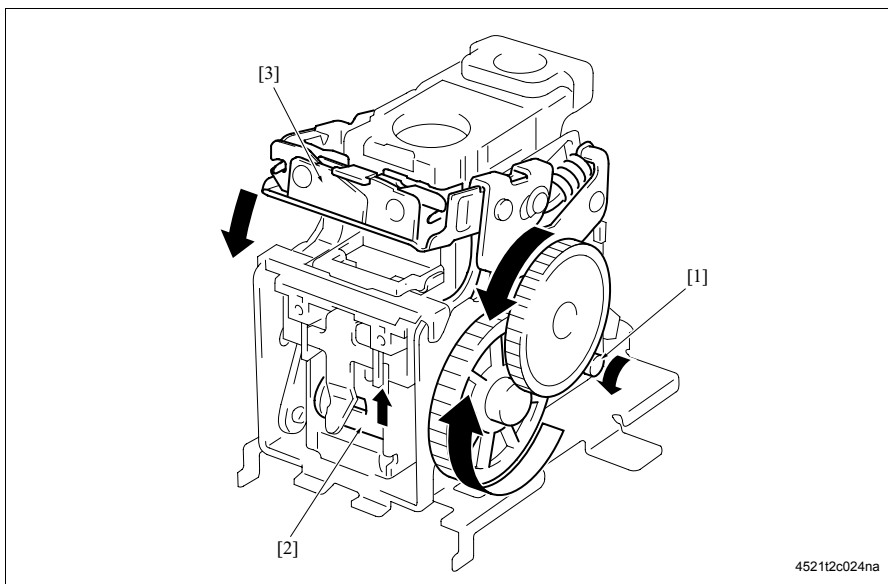
[4] Stapler /Fr

#### A. Control

- When the FS start signal turns ON, the stapler moving motor (M6) turns ON, and it stops at the stapling position.
- After completion of the job, the moment the paper exit motor (M3) turns OFF, it returns to the home position.

### 5.5.3 Stapling mechanism

- The stapling operation is made by the stapler.
- When the stapler motors /Rr (M16) and /Fr (M17) [1] are driven, the clinch arm [3] goes down to drive the staple blade [2] and hit in a staple.



[1] Stapler motors /Rr, /Fr (M16, M17)

[3] Clinch arm

[2] Staple blade

#### A. Control

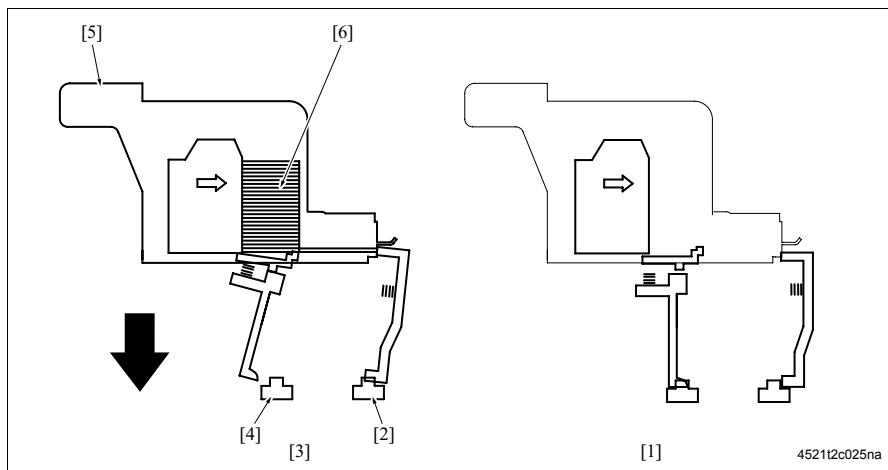
- A specified period of time after the intermediate conveyance sensor (PS3) detects the trailing edge of the last paper of the copy, the stapler motors /Rr (M16) and /Fr (M17) turn ON. After completion of the stapling operation, the motors stop.



### 5.5.4 Staple sheet empty control

#### A. Detection mechanism

- The detection of the staple sheet [6] is made by the staple empty sensors /Rr (PS20) and /Fr (PS23) [4].
- The detection of the staple ready is made by the staple ready sensors /Rr (PS21) and /Fr (PS24) [2].



- |   |  |
|---|--|
| [1] No staple condition                         | [4] Staple empty sensors /Rr, /Fr (PS20, PS23) |
| [2] Stapler ready sensors /Rr, /Fr (PS21, PS24) | [5] Stapler cartridge                          |
| [3] Staple set condition                        | [6] Staples                                    |

#### B. Empty detection control

- When the remaining staples get reduced to about 20, the staple empty sensors /Rr (PS20) and /Fr (PS23) turn ON with a message displayed on the main body LCD.
- In the middle of the stapling operation, when an empty condition is detected, the empty display is shown after completion of a series of operations.

#### C. Staple ready detection control

- After replacing (installing) a staple cartridge, the stapler motors /Rr (M16) and /Fr (17) drive until the stapler ready sensors /Rr (PS21) and /Fr (PS24) turn ON, and then send staples to the stapling position.



KONICA MINOLTA

## SERVICE MANUAL

Theory of Operation

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# SD-507





## (bizhub 501/421/361 )

# Revision history

After publication of this service manual, the parts and mechanism may be subject to change for improvement of their performance.  
Therefore, the descriptions given in this service manual may not coincide with the actual machine.

When any change has been made to the descriptions in the service manual, a revised version will be issued with a revision mark added as required.

Revision mark:

- To indicate clearly a section revised,  is shown at the left margin of the revised section.  
The number inside  represents the number of times the revision has been made.
- To indicate clearly a page that contains the revision,  is shown near the page number of the corresponding page.  
The number inside  represents the number of times the revision has been made.

## NOTE

Revision marks shown in a page are restricted only to the latest ones with the old ones deleted.

- When a page revised in Ver. 2.0 has been changed in Ver. 3.0:  
The revision marks for Ver. 3.0 only are shown with those for Ver. 2.0 deleted.
- When a page revised in Ver. 2.0 has not been changed in Ver. 3.0:  
The revision marks for Ver. 2.0 are left as they are.

2008/05	1.0	—	Issue of the first edition
Date	Service manual Ver.	Revision mark	Descriptions of revision

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## ■ OUTLINE

### 1. PRODUCT SPECIFICATIONS

#### A. Type

Type	FS built-in saddle-stitching device
Installation	Screwed to the FS
Document Alignment	Center
Stapling Function	Center parallel two points No. of sheets to be stapled together: 2 to 15
Consumables	Staples (2000 staples/cartridge)

#### B. Paper type

Type	Plain Paper, Recycled paper	56 to 90 g/m <sup>2</sup>
Size	Metric: A3, B4, A4S, B5S *2, 11 x 17, 8½ x 11S, Foolscap, 8K *1, 16KS *1 Inch: 11 x 17, 8½ x 14, 8½ x 11S, A3, A4S, Foolscap	
Capacity	200 sheets or 20 copies	

\*1: Only supported in Taiwan.

\*2: Supported in other than inch area and Taiwan.

#### C. Maintenance

Maintenance	Same as the main body.
-------------	------------------------

#### D. Machine specifications

Power Requirements	24/5V DC (supplied from FS)
Power Consumption	9.5 W or less
Dimensions	445 (W) x 478 (D) x 203 mm (H)
Weight	Approx. 9.3 kg

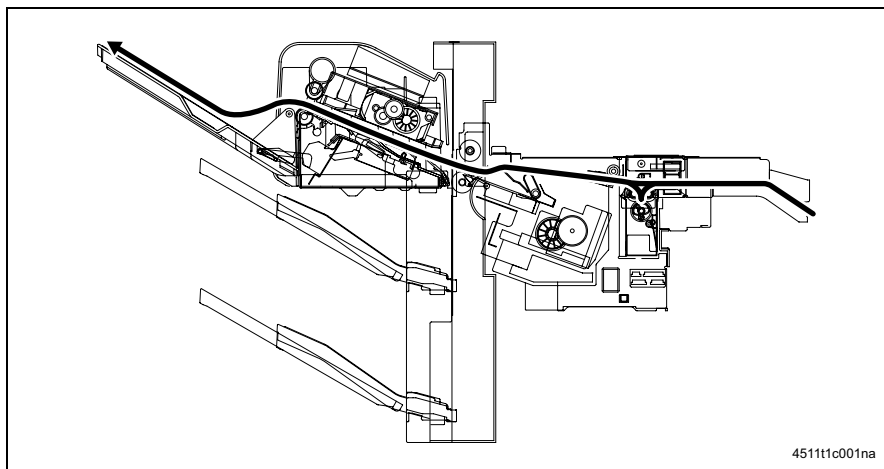
#### E. Operating environment

Temperature	Same as the main body.
Humidity	Same as the main body.

#### NOTE

- The information herein may be subject to change for improvement without notice.

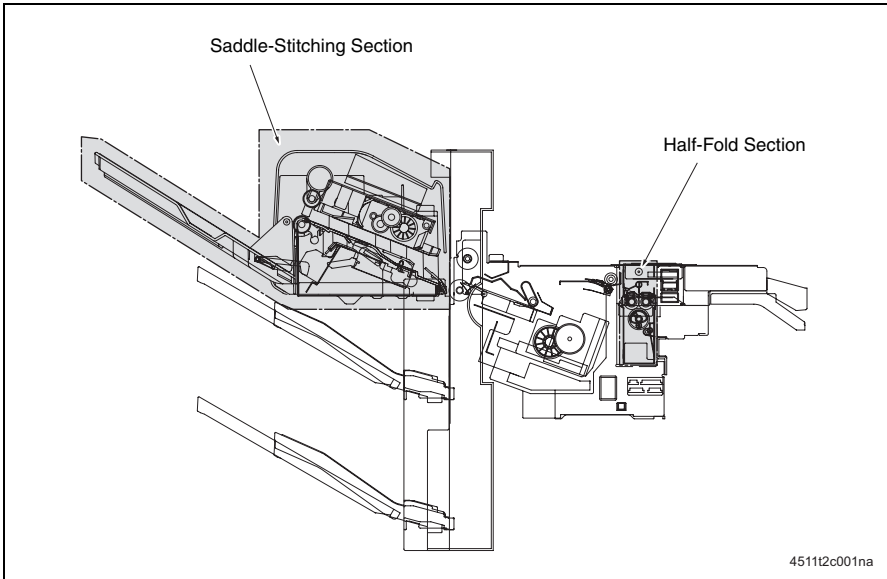
## 2. PAPER PATH



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## ■ COMPOSITION/OPERATION

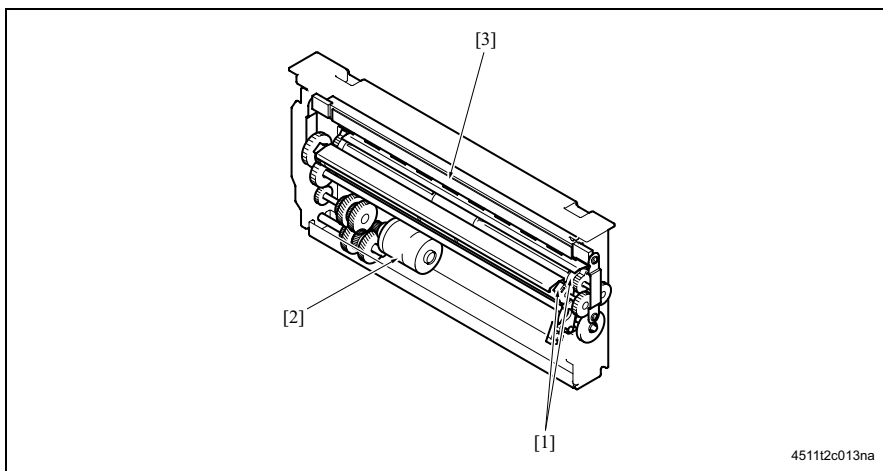
### 3. COMPOSITION





## 4. DRIVE

### 4.1 Half-fold section

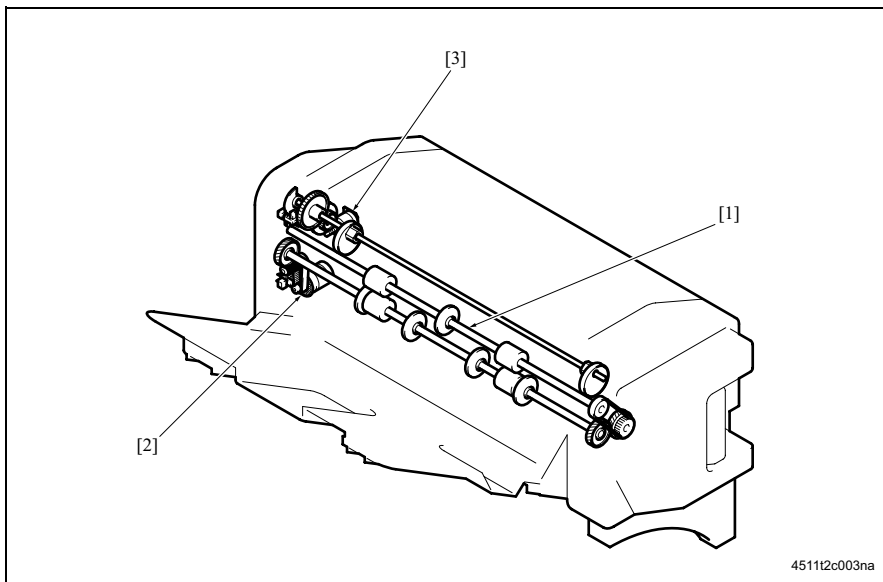


[1] Folding Roller

[2] Folding Motor (M10)

[3] Half-folding Blade

### 4.2 Saddle Stitching Section



[1] Conveyance Roller /Up

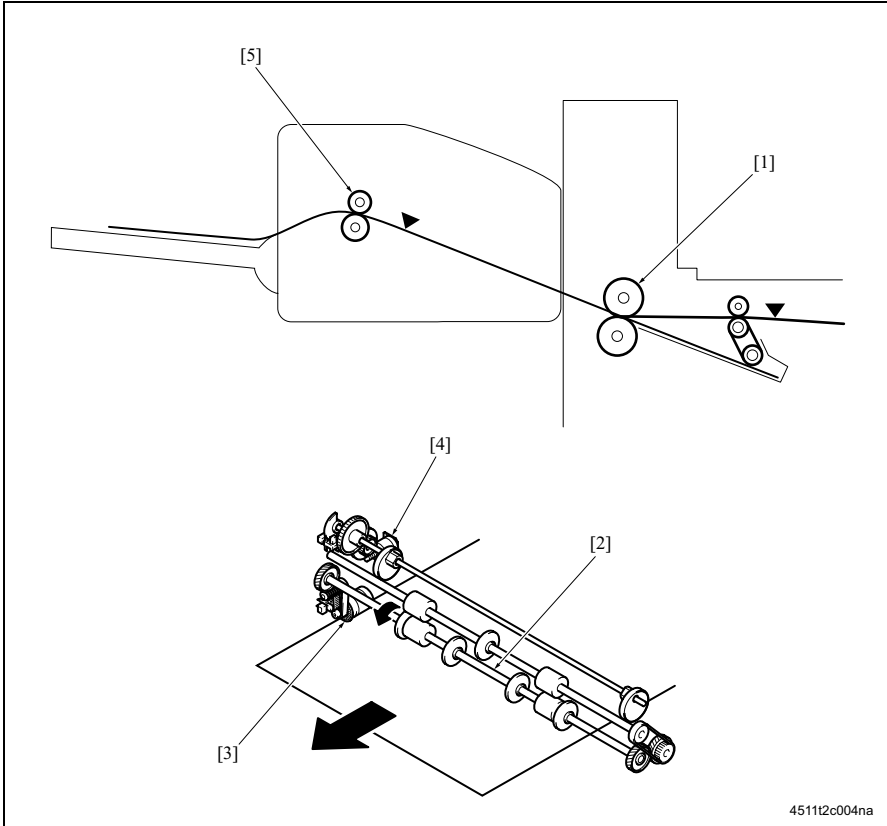
[2] Conveyance Motor (M8)

[3] Exit Open/Close Motor (M9)

## 5. OPERATIONS

### 5.1 Paper Conveyance mechanism

- Paper is conveyed by the Exit Rollers of FS and Conveyance Roller /Up [5], /Lw [2].
- The Conveyance Motor (M8) [3] provides the drive for the Conveyance Roller /Lw [2].
- If a center stapling operation is made with a bundle papers stored in the Stacker, a bundle papers is conveyed to the center stapling position, through a pulse control of the Exit Roller of FS.
- A bundle papers is thereafter fed out by the Conveyance Roller /Up and /Lw.



[1] Exit Rollers of FS

[2] Conveyance Roller /Lw

[3] Conveyance Motor (M8)

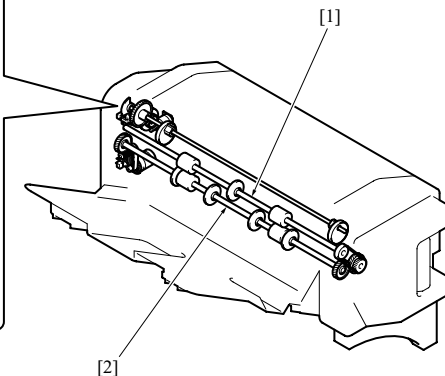
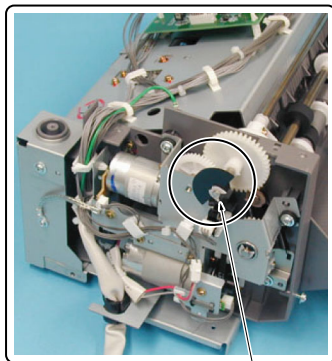
[4] Exit Open/Close Motor (M9)

[5] Conveyance Roller /Up

## 5.2 Conveyance roller pressure/release

### 5.2.1 Pressure/release mechanism

- The Conveyance Roller /Up [1] is moved away from, or pressed up against, the Conveyance Roller /Lw [2], when the paper is fed out as a bundle of papers.
- The Saddle Exit Home Sensor (PS18) [3] is used to control the pressure/release position of the Conveyance Roller /Up.



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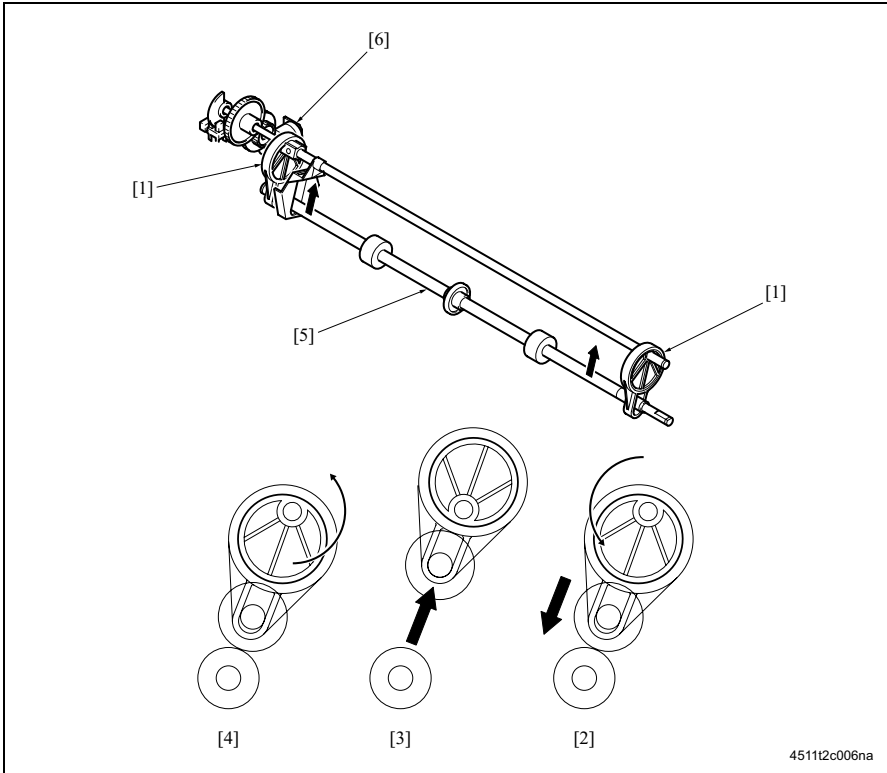
[1] Conveyance Roller /Up

[2] Conveyance Roller /Lw

[3] Saddle Exit Home Sensor (PS18)

### 5.2.2 Operation

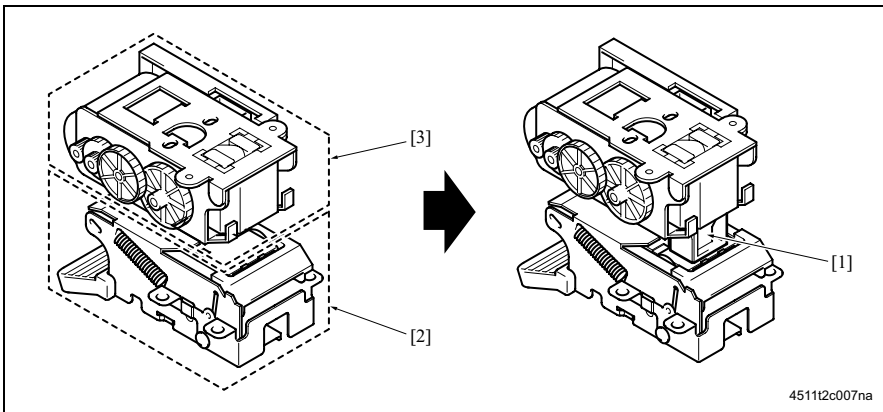
1. The Conveyance Roller /Up [5] is moved up or down by the cams which are driven by the Exit Open/Close Motor (M9) [6].
2. When a bundle papers moves past the Conveyance Roller /Up and /Lw, the motor is energized to press the Conveyance Roller /Up up against the Conveyance Roller /Lw, thereby feeding a bundle papers out into the tray.



- |  |                                |
|--|--------------------------------|
| [1] Cam  | [4] Cams are rotated.          |
| [2] Cams are rotated. + The Conveyance Roller / Up is moved downward (pressing). | [5] Conveyance Roller /Up      |
| [3] The Conveyance Roller /Up is moved upward (retraction).                      | [6] Exit Open/Close Motor (M9) |

### 5.3 Stapling mechanism

- The Staple units [2] position are fixed.
- Since the unit are for center stapling only, it is made up of the upper clincher portion [1] and the lower stapling portion. A bundle papers moves through the space between the upper and lower portions of the staplers.
- When stapling, the clincher portion moves downward to perform the stapling operation.



[1] Clincher Portion

[2] Staple Unit

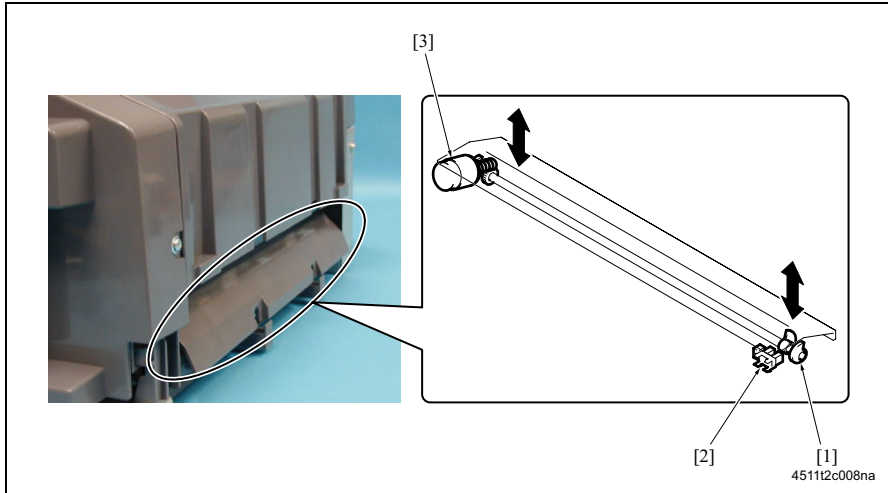
[3] Clincher Unit

## 5.4 Staple guide

- The Staple Guide is used to guide the leading edge of the first sheet of paper when the first sheet of paper is stored, thereby preventing the leading edge from contacting the Stapling Unit and jamming.

### 5.4.1 Staple guide mechanism

- The Staple Guide Motor (M14) [3] turns the cams at the front and rear, thereby moving the Staple Guide up or down.
- The Staple Guide Home Sensor (PS26) [2] detects the position of the Staple Guide.



[1] Cam

[3] Staple Guide Motor (M14)

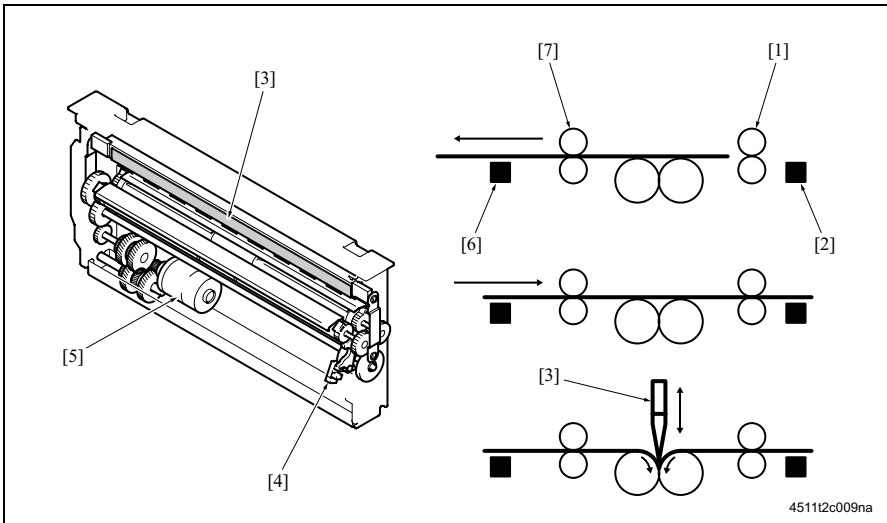
[2] Staple Guide Home Sensor (PS26)

### 5.4.2 Operation timing

1. Raising the Staple Guide  
(power ON, Sleep cancelled, error reset, paper removed from tray)
2. Lowering the Staple Guide  
(When the conveyance of a bundle papers to the center stapling position is completed)
3. Raising the Staple Guide  
(When the trailing edge of a bundle papers deactivates the Exit Sensor (PS20))

## 5.5 Half-folding mechanism

- The Entrance Sensor (PS4) [2] of FS detects the trailing edge of the paper.
- The paper feed amount is determined for each paper size as counted from the timing when the trailing edge is detected. Half-folding is effected as follows. Specifically, the paper undergoes a switchback operation and is conveyed to the half-folding position as the motor is turned backward.
- The Half-Folding Blade [3] is lowered and the center of the paper is pinched between the Folding Rollers and this creates a crease in the paper.
- After the half-folding, the paper is conveyed by the Conveyance Roller [7] and then the Registration Roller [1] as they are driven in that order.

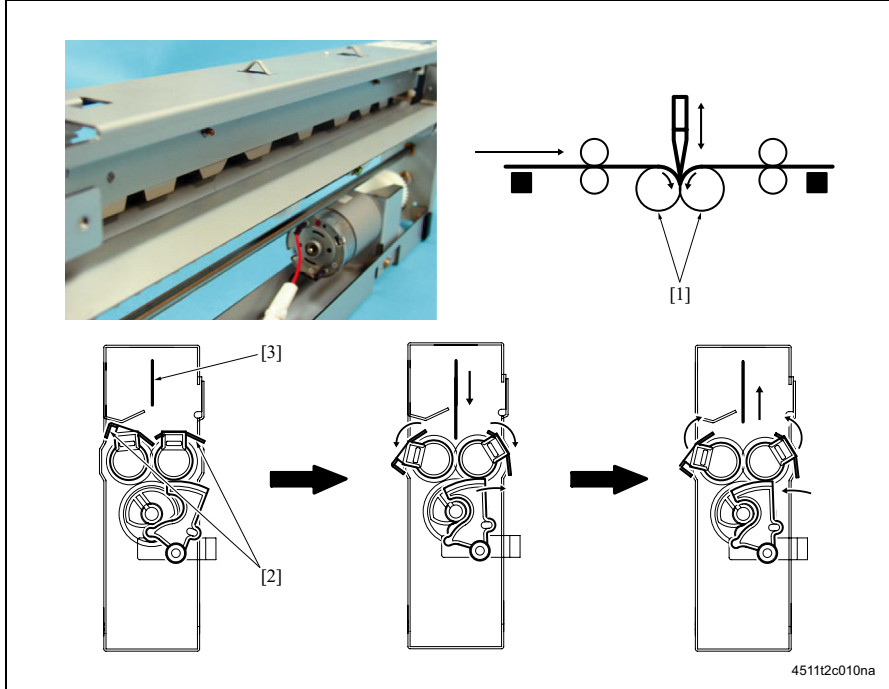


- [1] Registration Roller
- [2] Entrance Sensor (PS4)
- [3] Half-Folding Blade
- [4] Folding Roller Home Sensor (PS22)

- [5] Folding Motor (M10)
- [6] Conveyance Sensor (PS5)
- [7] Conveyance Roller

### 5.5.1 Operation

- When the Folding Motor (M10) is energized for one cycle of operation, the Conveyance Guides /Lw [2] are retracted to the right and left and the Half-folding Blade [3] makes one up-and-down reciprocating motion. In synchronism with the sequence of these operations, the Folding Roller [1] turns one complete turn to pull the paper downward at its center.
- At the same time that the Conveyance Guides /Lw returns to their original position, the Half-folding Blade goes up.



[1] Folding Roller

[3] Half-folding Blade

[2] Conveyance Guides /Lw

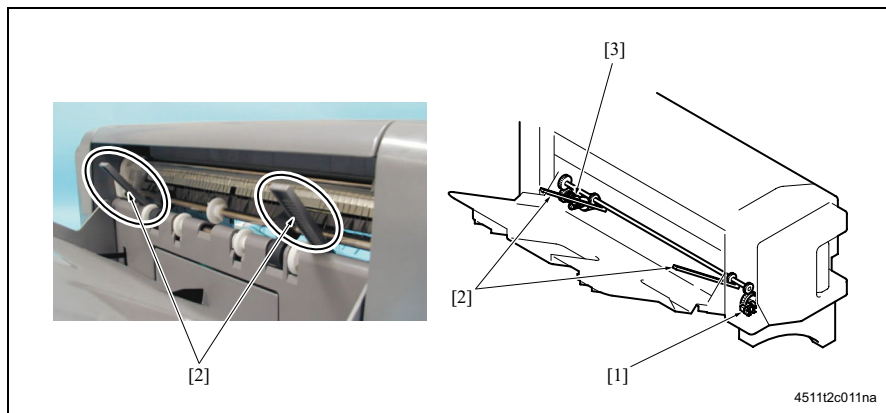


## 5.6 Paper guide

- When a bundle papers is fed onto the tray, the Paper Guide supports the leading edge of the paper of a large size so as to prevent it from pushing the trailing edge of the paper that has previously been fed out.
- The Paper Guide is driven only when paper with a length of 257 mm or more will be stored.
- The Paper Guide advances when the Entrance Sensor (PS4) of FS is OFF and retracts when the trailing edge of the paper passes the Exit Sensor (PS20).

### 5.6.1 Paper guide mechanism

- The Paper Guide Motor (M13) [3] drives the Paper Guide [2].
- The Paper Guide Home Sensor (PS23) [1] is used to control the home position of the Paper Guide.



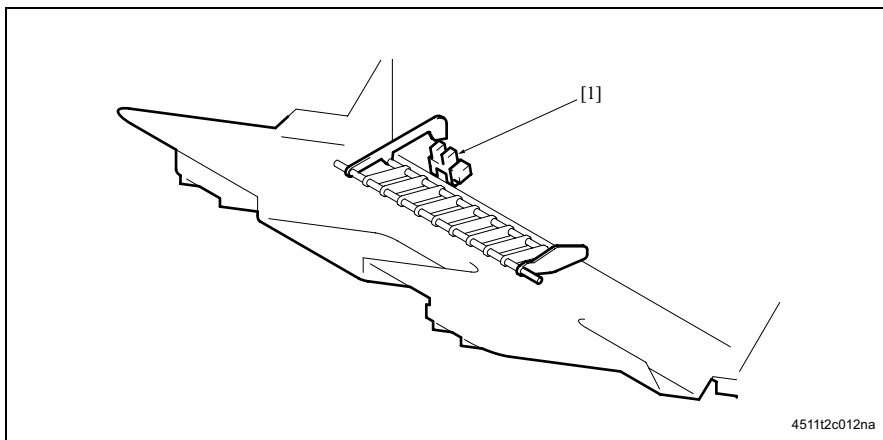
[1] Paper Guide Home Sensor (PS23)

[3] Paper Guide Motor (M13)

[2] Paper Guide

## 5.7 Tray paper detection

- When paper is fed onto the tray, it pushes the actuator, which causes the Tray Empty Sensor (PS21) [1] to detect the paper.



[1] Tray Empty Sensor (PS21)

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KONICA MINOLTA

## SERVICE MANUAL

Theory of Operation

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# MT-502





## (bizhub 501/421/361 )

# Revision history

After publication of this service manual, the parts and mechanism may be subject to change for improvement of their performance.  
Therefore, the descriptions given in this service manual may not coincide with the actual machine.

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2008/05	1.0	—	Issue of the first edition
Date	Service manual Ver.	Revision mark	Descriptions of revision

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OUTLINE
COMPOSITION/OPERATION

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■ OUTLINE

1. PRODUCT SPECIFICATIONS

A. Type

Type	4 bins Mailbin (available only for printing from PC)
Installation	Screwed to the FS
Number of Bins	4 bins
Number of Sheets Stored per Bin	125 sheets (80 g/m <sup>2</sup> )
Storable Paper	Plain Paper (56 to 90 g/m <sup>2</sup> ), Recycled paper (56 to 90 g/m <sup>2</sup> )
Storable Paper Size	Metric: A4, B5, 8½ x 11 Inch: 8½ x 11, 5½ x 8½S

B. Maintenance

Maintenance	Same as the main body.
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C. Machine specifications

Power Requirements	24V DC (supplied from FS)
Dimensions	340 (W) x 509 (D) x 387 mm (H)
Weight	Approx. 8 kg

D. Operating environment

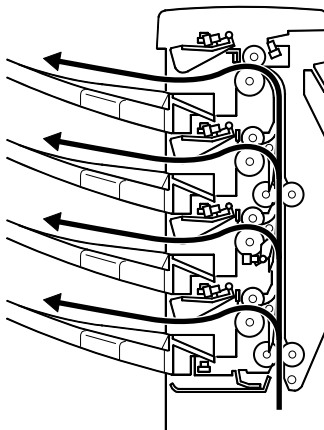
Temperature	Same as the main body.
Humidity	Same as the main body.

NOTE

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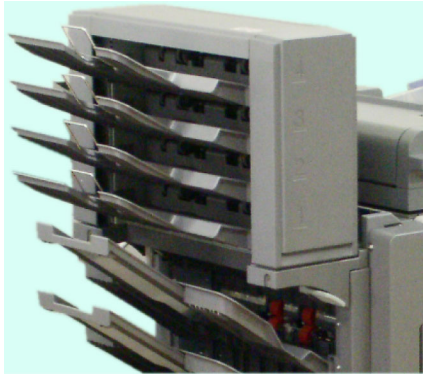
## 2. PAPER PATH



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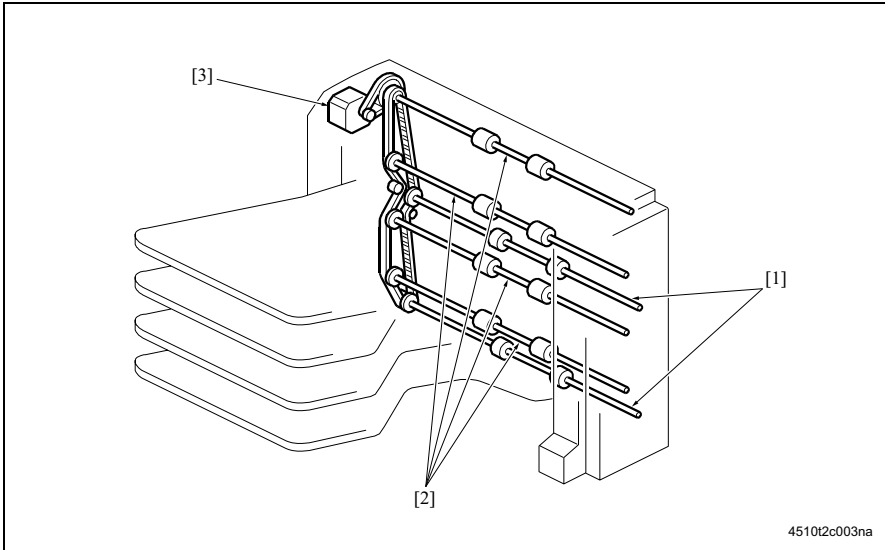
## ■ COMPOSITION/OPERATION

### 3. COMPOSITION



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## 4. DRIVE



[1] Conveyance Roller

[2] Exit Roller

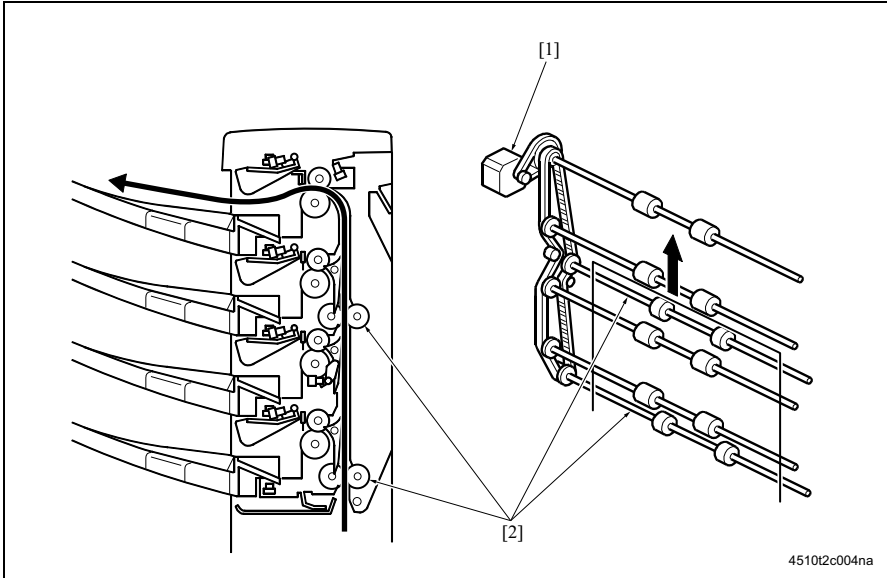
[3] Conveyance Motor (M1)

4510t2c003na

## 5. OPERATIONS

### 5.1 Paper conveyance mechanism

- When the Mailbin is selected as the exit source, paper is fed off from the Finisher (FS-522) and toward the Mailbin.
- Drive for the Conveyance Rollers [2] of the Mailbin is transmitted from the Conveyance Motor (M1) [1] by way of a belt.
- As each of the Conveyance Rollers is driven, paper fed off from the Finisher is conveyed into the Mailbin.

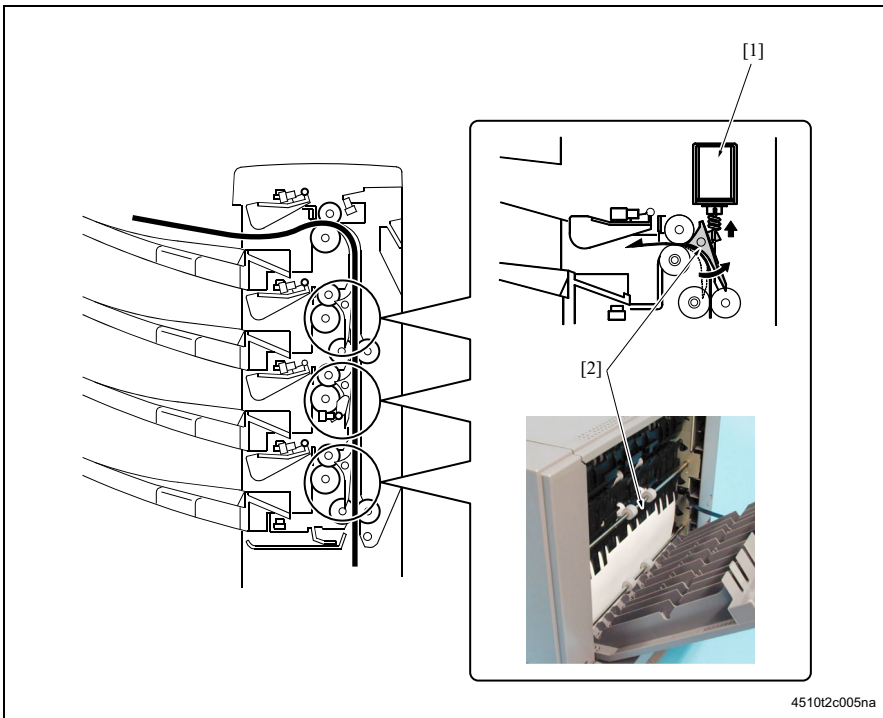


[1] Conveyance Motor (M1)

[2] Conveyance Roller

## 5.2 Paper path selection mechanism

- The Gate Solenoid /1, /2, /3 (SD1, SD2, SD3) [1] are energized or deenergized to direct paper fed from the Finisher into a specific tray.
- There are SD1, SD2, SD3 provided that will be energized or deenergized to operate the corresponding Gate [2], thereby selecting a specific paper path into a specific tray.

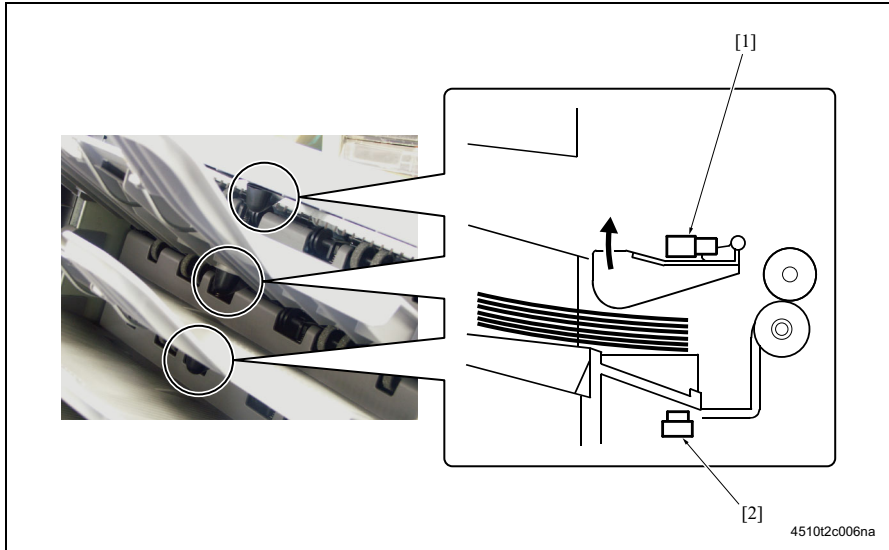


[1] Gate Solenoid /1, /2, /3 (SD1, SD2, SD3)

[2] Gate

### 5.3 Paper detection

- The Paper Detection Sensor /1, /2, /3, /4 (PS1, PS2, PS3, PS4) [2] detects any sheet of paper that is fed into the tray, causing the LED to light up blue steadily to inform the user that a sheet of paper has been fed into the tray.
- As the paper stacks up and eventually deactivates the Paper Full Sensor /1, /2, /3, /4 (PS5, PS6, PS7, PS8) [1], at which time a paper full condition is detected.



[1] Paper Full Sensor /1, /2, /3, /4 (PS5, PS6, PS7, PS8)

[2] Paper Detection Sensor /1, /2, /3, /4 (PS1, PS2, PS3, PS4)

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KONICA MINOLTA

## SERVICE MANUAL

Theory of Operation

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# JS-502 (bizhub 501/421/361)







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# ■ OUTLINE

## 1. PRODUCT SPECIFICATIONS

### A. Type

Name	Job Separator
Type	Expansion tray
Installation	Installed in the main body
Document Alignment	Center

### B. Paper type

Exit Tray	Size	Type	Capacity
Tray 2 (Main Body Tray)	Inch: 11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S, 5½ x 8½S A3, A4, A4S, Foolscap Metric: A3, B4, A4, A4S, B5, B5S *2, A5S, B6S 11 x 17, 8½ x 11, 8½ x 11S, Foolscap, 8K *1, 16K *1, 16KS *1	Plain Paper (56 to 90 g/m <sup>2</sup> )	250 sheets
		Special	OHP transparencies
			Thick paper (91 to 210g/m <sup>2</sup> )
			Envelope
			Label paper
Tray 1 (Job Tray)	Inch: 11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S, 5½ x 8½S A3, A4, A4S, Foolscap Metric: A3, B4, A4, A4S, B5, B5S *2, A5S, B6S 11 x 17, 8½ x 11, 8½ x 11S, Foolscap, 8K *1, 16K *1, 16KS *1	Plain Paper (56 to 90 g/m <sup>2</sup> )	Letterhead

\*1: Only supported in Taiwan.

\*2: Supported in other than inch area and Taiwan.

### C. Maintenance

Maintenance	None
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### D. Machine specifications

Power Requirements	5V DC ± 5 % (supplied from the main body)
Power Consumption	0.2 W or less
Dimensions	450 (W) x 443 (D) x 75 mm (H)
Weight	Approx. 1.7 kg

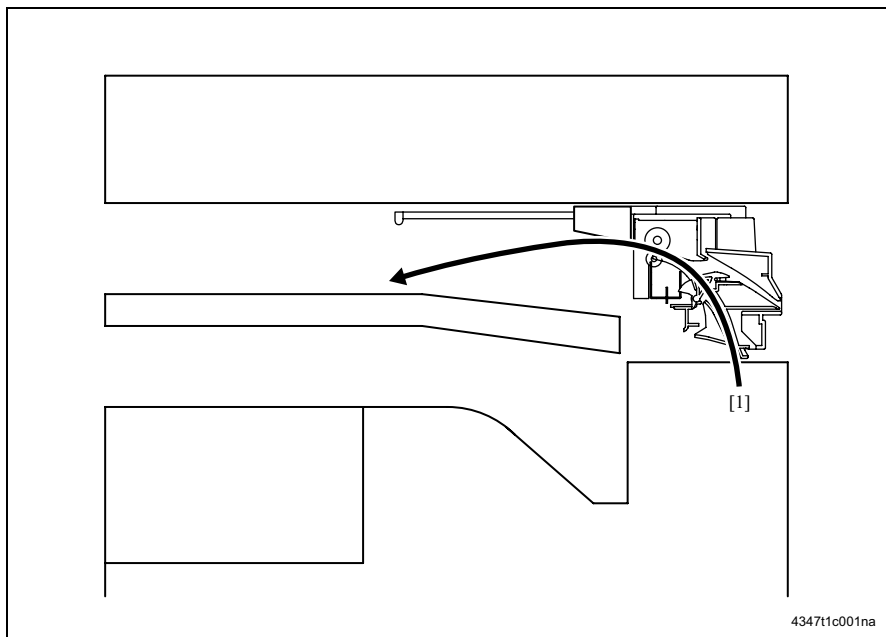
### E. Operating environment

Temperature	Same as the main body.
Humidity	Same as the main body.

### NOTE

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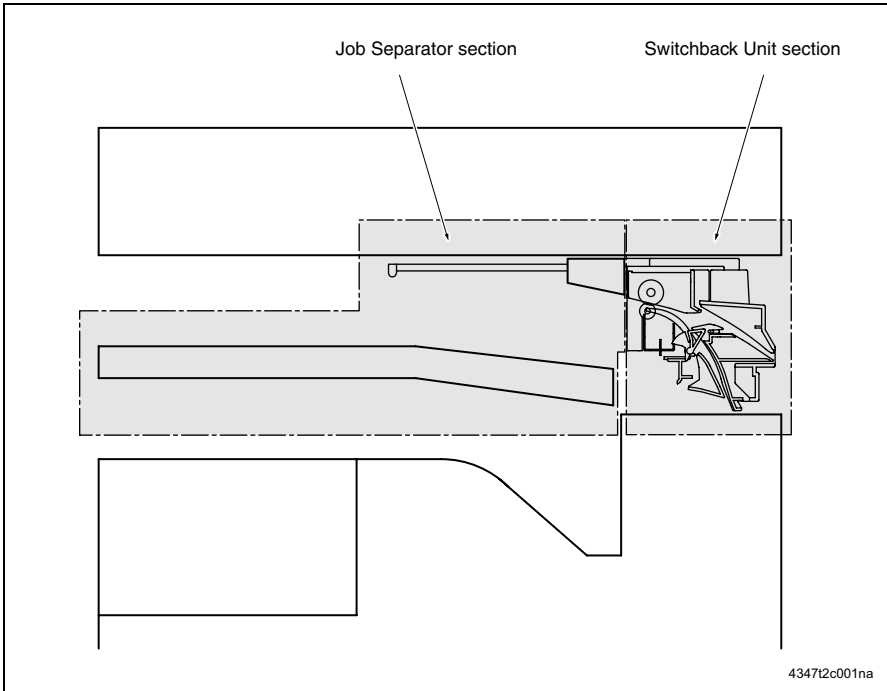
## 2. PAPER PATH



[1] Conveyance from the main body

## ■ COMPOSITION/OPERATION

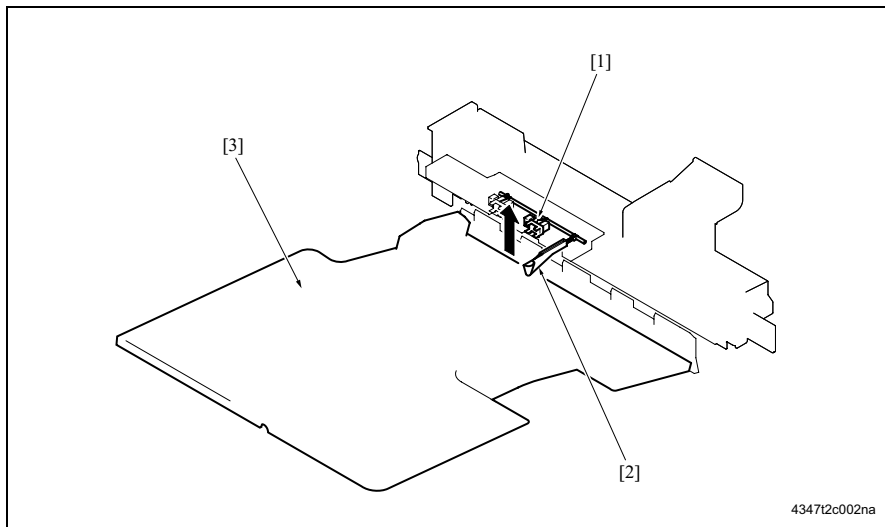
### 3. COMPOSITION



## 4. OPERATIONS

### 4.1 Job Tray Conveyance/Exit

- The Switchback Unit functions to convey paper through, and feed it out from, the Job Tray.
- The paper sensor section of the Job Tray is mounted to the Switchback Unit, thereby detecting paper.
- When paper stacks up on the Tray [3], the actuator [2] is pushed up by the paper, indicating that there is paper at the exit port.



[1] Paper Full Sensor (PS1)

[3] Tray

[2] Actuator

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